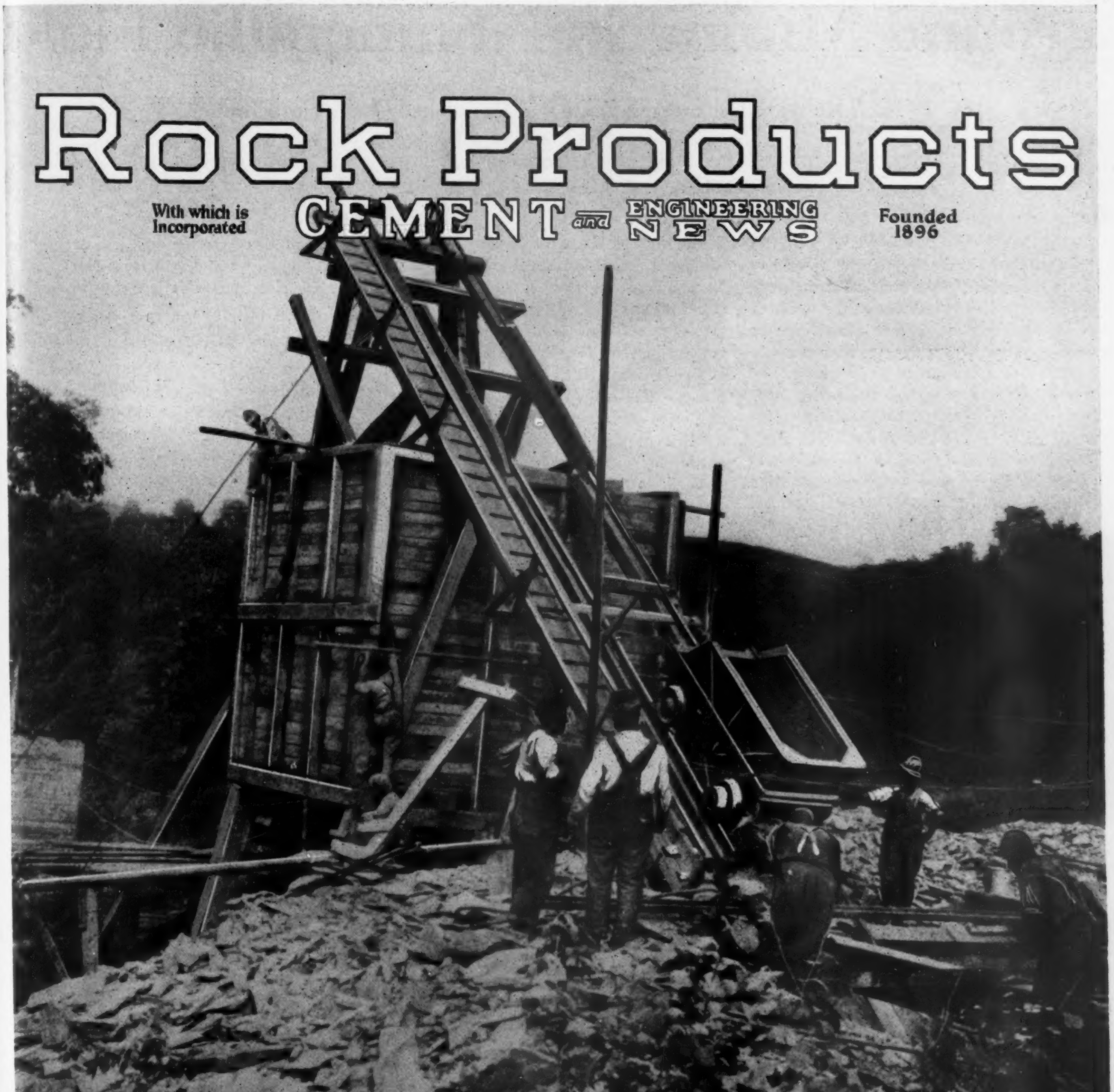
Volume XXXI Chicago, May 26, 1928 Number 11

Rock Products

With which is Incorporated CEMENT and ENGINEERING NEWS

Founded 1896



Sinking an inclined shaft for the underground working of a Vermont slate quarry

Diamond-Core Drilling and Underground Mining in Nonmetallic Field

Their Relation to Lowered Costs and Controlled Quality of Product

By L. D. Cooper, E.M.
General Manager, E. J. Longyear Co., Minneapolis, Minn.

DURING THE LAST FEW YEARS, the relatively simple problems of production and markets in the nonmetallic industry have become highly complex as the result of rapid expansion and keener competition in more exact markets. Buyers are increasingly rigid in their specifications as they have come to realize the necessity of demanding products specifically adapted to the uses for which they are desired. In the old days, merely to have a product for sale was enough, while the present day operator must furnish a uniform product carefully graded and classified if he is to survive. The expansion of the production program has created a necessity for reducing costs in the struggle to maintain or increase net earnings on a frequently rising capital investment. Of equal importance with low production costs is control of the quality of output, for it is necessary that the producer be in a position to guarantee a steady quantity output of uniform grade. It is the purpose of this article to show how diamond-core drilling and, in many cases, underground mining methods, may be effectively used toward the solution of these problems.

Before proceeding, a brief description of the diamond drill itself may be of interest. It consists of a power unit driven by steam, air, gasoline, or electricity. A system of gears transmits a rotary speed of 250 to 350 r.p.m. under a downward pressure to a line of hollow steel drill rods, at the end of which is attached an annular steel bit set with from six to eight carbons, or black diamonds, averaging in size from two to six carats each. Cutting or grinding is accomplished by means of the rotating action of the bit. A cylindrical core is produced, which passes into the core barrel above the bit as the rods continue their downward progress. The core is held in place by a core spring when the rods are withdrawn from the hole at desired intervals, and the core removed from the core barrel. When drilling, the bit is cooled by water pumped through the rods. This circulating medium washes up the cuttings resulting from drilling, and is collected in tanks or barrels where it is allowed to stand until the cuttings have settled. The water is then drained off, and the cuttings, with the core, comprise the sample. The rock cores obtainable by diamond drilling may vary in diameter from 15/16-in. to 4 in., according to the type of drill used, which in turn, is governed largely by the depth of drilling and the probable character of rock to be penetrated. The core taken in a friable structure will stand up better when not less than 2 in. in diameter.

The practical feature to be emphasized is that the drill cores recovered show an accurate cross-section of the rock in place—first-hand knowledge of what lies beneath the overburden. The rock cores are marked as to depth as they are removed from the core barrel, and laid in sequence before the engineer. They clearly indicate the various strata and rock conditions of the area tested. Most important to producers is the fact that the cores may be tested for both their physical and chemical characteristics. Advance information gained by diamond drilling plays an important part toward the reduction of costs in many phases of the operation.

Preliminary Exploration

It is obvious that every operator requires complete knowledge of his property in order that his enterprise may be conducted and planned on a sound business basis.

A thorough diamond drilling of the property will yield three essential facts: (1) The quantity of marketable material may be readily computed from the area and thickness of beds or strata. (2) The quality of material and its adaptability to specific uses is revealed by physical and chemical tests of the rock cores. (3) The question of mineability can be answered by a study of the facts of physical distribution of the material and the dip of the strata.

In addition to securing these data of primary importance, diamond-core drilling provides a means of economical and rapid prospecting when scouting around for stone for some specific purpose. It is equally valuable in blocking out stone and keeping reserves in proper relation to production. When tracts are optional as potential reserves, the value of these lands may be determined by drilling so that those which are barren may be disposed of, thus eliminating the payment of unnecessary taxes.

There is one other feature which is deserving of particular mention. The data secured by diamond drilling showing the quality and extent of the stone furnish a dependable basis upon which to go before a board of directors for additional appropriations to carry out development plans, or for the securing of outside financing in developing a new enterprise.

Development

In planning quarry operations, it is essential to have an exact knowledge of what lies under the surface before taking the first step in laying out a development program. At this stage, diamond-core drilling may save many times its own cost, for a thoroughly drilled property means that permanent plans may be made. Changes in operating plans are costly and are usually due to lack of complete preliminary information.

Obviously, the operator should first determine with a diamond drill the exact location, area, depth and quality of the stone. When it comes to stripping, he must know the amount and nature of the material to be stripped. He must know the thickness of the overburden, and the amount of worthless, weathered, or broken stone to be removed with the surface material. The planning of the surface arrangement of washing plants, mills, railroad tracks, stripping dumps, and houses bears direct relation to the physical characteristics, distribution and purposes of the deposits. In planning the quarry layout, the engineer will find diamond drilling data of value in determining the best grade for haulage, handling water, locating the best quarry floor, and determining the height of face to be worked. It is evident that proper equipment for a quarry and crushing plant can be selected only when there is full knowledge of the thickness of individual beds, hardness of stone, amount of fines, and method of drilling and blasting.

All questions of development relate directly to the ore body—its thickness, quality, extent, and physical characteristics, which are discoverable by thorough diamond drilling. An estimate of production costs can be made only after all of the facts have been determined and the plan of operation decided upon. Diamond-core drilling will be found of value whenever advance information regarding unusual conditions is desired, or where an extension of present quarries or production from lower levels is planned.

There are cases where good beds dip under worthless stone, thereby increasing the amount of stripping necessary to a point

where costs are prohibitive. Under these circumstances, diamond drilling may show that the adoption of underground mining may save the day, both as to production and costs.

Market

Sales policy may seem far removed from diamond drilling at first glance. It is closely related, however, for through a test of the rock cores the chemical and physical characteristics of the stone may be determined, resulting in a more intelligent grading and selection of rock to meet different specifications. Where it is desirable or necessary, customers may be furnished with the results of physical and chemical tests. Knowledge of his reserves and of graded productive capacity enables the operator to meet large or unusual demands, and be assured of a uniform product over a long period.

Underground Mining

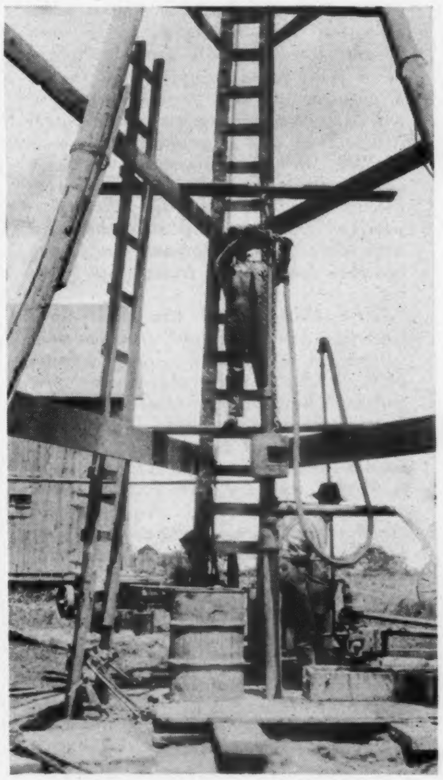
Under certain operating conditions, production costs may be lowered and quality of output more certainly controlled by adopting underground methods. Of two properties, both favorably located and having equally desirable stone, the deposit which outcrops or has thin overburden is the first to be opened, generally by quarrying methods. When such deposits are exhausted and when the demand for stone becomes more urgent, deposits with increasingly greater overburden must be considered. Under these conditions, it is not always easy to determine when underground methods may be most advantageously employed, either as a substitute for or used in connection with quarrying.

There are other properties, however, where conditions point clearly to the necessity of abandoning quarrying and adopting underground methods. For example, where strata dip at an angle, the tendency is to quarry along the outcrops, thus extending in the direction of the strike. When limits of the property are reached, further enlargement results in increased overburden, which may become so heavy that profitable open-pit work is impossible, which then means abandonment of the quarry or the adoption of underground methods.

Not only is underground mining of advantage where heavy overburden exists, but it is a means of controlling the purity of product produced where clay pockets and seams are found in the upper ledges. With stripping it is impossible to prevent a small amount of clay, sand or gravel becoming intermixed with good stone. This is a difficult and expensive problem, for clay and sand impurities usually associate with the fines and are frequent causes of rejection by the purchaser of fluxing stone. The same ledges of stone can be worked by underground methods, areas containing sand and clay can be avoided, and a stone free from foreign matter can be produced. In properly conducted underground operations, fines are as clean and pure as lumps, resulting in a product for which there is a broadening market.

Clay pockets and seams are not the only causes of impurities becoming intermixed with good stone, for after rainstorms the grade of rock from a quarry is usually lowered by surface material washed into the pit. Higher quality of lime can be produced from stone free from surface impurities.

Steeply inclined beds of good stone may dip under those that are worthless, or ledge of good quality may underlie stone not of present commercial grade, but possessing future value. Under such conditions, it is often less expensive to recover the good stone by mining, leaving the poor stone in place, than first to remove the poor stone by quarrying.



Drilling through deep overburden to reach limestone beds in central Illinois

Where workable beds lie in vertical or steeply inclined position, the amount of stone recoverable is limited by the depth to which the quarry may be operated. No such limitation exists for underground mining.

The foregoing article outlines nothing that is new or unusual in procedure or method to the nonmetallic operator. It does, however, emphasize the importance and value of diamond-core drilling and underground mining methods under certain conditions, and shows their direct relationship to production costs and control of quality of output. These two considerations are of vital importance if an enterprise, in these days of keen competition, expects to hold or broaden its markets, earning the right to be classed among the commercially successful by the measure of consistent earnings from year to year.

Structural Gypsum

GYPSUM floors or roofs may be either poured-in-place or precast, and of the reinforced suspension system or of slabs or tiles in which the gypsum acts structurally. Poured gypsum suspension floors and roofs are used extensively in fireproof construction. In this type of installation, which is also known as the Metropolitan system, the design is based on the same principle as that of the suspension bridge. It consists of a monolithic gypsum fiber concrete made of "first settle" gypsum and not more than 12½% by weight of wood chips, excelsior or fiber. This concrete is poured-in-place on parallel and uniformly spaced steel cables which are placed in suspension, the ends of the cables being securely and rigidly anchored to the frame of the building. Each cable consists of two No. 12 gage cold drawn, galvanized steel wires which are twisted. The cable spacing depends on the span used and the load to be sustained. The form work is similar to that used in reinforced concrete construction. After the completion of the forming, the steel cables are placed in position and the gypsum fiber concrete is poured. The superimposed loads are transferred to the cables, which carry the entire load, through the gypsum slab.

In precast construction, the gypsum tile, which is made of neat "second settle" gypsum, is of the type of construction in which the gypsum acts structurally. This type of construction has been successfully used since 1912, although short span roof constructions of reinforced gypsum were popular some years before. This system differs from the suspension system in that the construction is designed in accordance with the accepted formulae for reinforced concrete recommended by the Joint Committee on Standard Specifications for Concrete and Reinforced Concrete, with the exception that appropriate working stresses are used.

Gypsum concrete, used in floor or roof construction, may be either poured-in-place or precast. In such constructions the gypsum concrete functions structurally and the design is based on the same principles as those of reinforced portland cement concrete. Gypsum concrete may be either gypsum fiber concrete as described under the suspension system, or gypsum aggregate concrete, which is composed of "second settle" gypsum, sand, broken stone, crushed blast furnace air cooled slag or steam boiler cinders. The gypsum, sand and coarse aggregate are mixed in the proportions of 1½ parts of gypsum, 1 part of sand and 3 parts of coarse aggregate by volume. Gypsum concrete in this type of construction is used in floor and roof constructions consisting of reinforced poured-in-place or precast slabs. Gypsum coarse aggregate concrete for floor and roof construction is used mainly in connection with steel joist construction.—*Abstract, "Structural Gypsum," by Henry J. Schweim, Chief Engineer, The Gypsum Industries.*

Operating 20 Small Sand Dredging Plants with One Organization

Consumers Sand Company, Topeka, Kansas, Combines Successfully the Activities of Eleven Formerly Independent Operating Companies

"WE TOOK OUR PROPOSITION to New York," said President Laughead, of the Consumers Sand Co. of Topeka, Kan., "but the bankers there would not listen to us. 'What! Issue bonds and form a big company to dig sand!' they said, 'Impossible; why, sand is everywhere!' We had some copies of ROCK PRODUCTS with us and we exhibited them, and showed from the financial pages that 'digging' sand was a very respectable business and that some good-sized companies were producing sand for commercial purposes and that some of these companies had floated fair-sized bond issues. But it was of no use. They simply couldn't see the sand business in New York.

"Then we tried Chicago. We found they know rather more about the sand business there than the bankers in New York, but we could not get them to give our proposition such consideration as we wanted them to. So we came home and decided to do our own financing. We had our plants and we had our credits, and we simply pooled them and went ahead."

"What reasons made consolidation necessary or even advisable?" he was asked.

Pooling Resources

"There were two reasons," he replied. "The first is a reason that applies to the sand business everywhere; that it is getting to a point where this business cannot be satisfactorily handled by a number of small, individual companies. It is never satisfactory to either buyer or seller, to have a good-sized contract filled by two or three independent concerns. But in our case a more powerful reason was that there were altogether too many plants operating for the tonnage that was produced. Not but what all of the plants might be needed one time or another, as the nearest plant to the job should be, logically, the plant to supply the sand for that job. But there was not enough business to keep all the plants running to anywhere near their full capacity all the time. It looked like good business for us to run to capacity those plants which were nearest to the jobs we had to supply, and to hold the others in reserve until they were needed."

"Well, how has it worked out?" he was asked.

"Not so badly. Eventually we may find ourselves in better shape than if we had succeeded with our bond issue. We have met our obligations and have made the most necessary improvements to our plants; and we have added some new equipment. But it would have been much easier if we could have had ample cash in hand, such as a bond issue would have given us. For example, we have had to build two plants, and are building two more, and the money for these had to be taken out of the current income. We could go ahead a lot faster and develop the business according to the way we have planned, if we had succeeded in financing in the way that we tried at first."

Editor's Note

WITH the increasing pressure of over-capacity, many farsighted producers of rock products are constantly on the lookout for a solution, fair and equitable to all, and to the public. In a few instances such men have, apparently, found a solution to the problem in consolidations of numerous small operations into one organization.

This article describes such a consolidation—a particularly interesting example because the companies and their plants brought into this consolidation were not notable for size or individual prestige.

The things that the consolidation has accomplished, besides stabilization of the business generally, include the solution of the difficult human problem of getting former competitors and individualists to do good team work for the whole institution; to develop a new material exactly fitted to a real economic need; to do research work to improve the products made; to study the markets and work out a sound economic analysis of the business, profitable in the long run to both the company and the public.

These are real accomplishments and mark a milestone in the progress of the sand and gravel industry. It will never be possible to prevent new competition—perhaps from entirely unnecessary plants—but it certainly will make it much harder for such new competition to succeed, because the consolidation has prestige and goodwill built upon genuine service and quality of products.—The Editor.

Getting Teamwork from Individualists

Such combinations have been tried before and failed, and one of the main reasons for failure in the past has been that the men who formed the combination found it difficult to give over the authority they had as heads of their own business. It is hard for a man who has been a boss all his life to subordinate his judgment to another's. Mr. Laughead was asked about this feature of the combination.

"We all understood how that would be from the beginning," was his answer. "It wasn't easy for some of us to see the plants we had run for years controlled by someone else, and perhaps run in a way that did not accord with our ideas. But we all had the success of this company as our main objective. I think it speaks well for the high character of the men composing our corporation that we have gone on with so little internal friction.

"We have had some things beyond our control that were against our success and some things that were for it," he went on. "General business in the past ten years was, as you know, none too good in this section. But to balance this we had the sand-gravel road business, with which we were pioneers, so far as this section of the country is concerned. This has been successful from the start, and a number of our plants are making only this material.

Meeting a Real Economic Need

"We consider that in introducing this material we have done something more than make a business opportunity for ourselves; we feel that we have solved the problem of secondary roads, so far as the heavy soils of the prairie states are concerned. The roads have been in use long enough now so that no one doubts either their success or their economy. Where we gave a carload or two carloads to a county or a township, to experiment with, we are now selling orders of twenty, thirty, forty or even more carloads at a time. I do not think it is saying too much to state that our present success and our good prospects for the future largely come from our introduction of this material."

"Was there any serious objection raised to your combining on the ground that you were forming a 'sand trust'?" President Laughead was next asked.

Monopoly Not the Goal

"We had no serious opposition on that score and of course we had good legal advice before we organized. And everyone knows that we are not a trust in the sense that we

control the output and the market. We have plenty of competitors, and they get their full share of the business. We know as a matter of fact that both their business and ours has increased recently, through our efforts.

"We do not want to 'hog the market' or hold up anyone. Our purpose is to make money in the only way that such a combination can make it legitimately, by giving the public better service and materials for the same money; that is, of course, by cultivating the public's goodwill. We have not yet succeeded in reducing the price of our products, but it is our purpose to do so when the business develops to such a point that we can cut our costs correspondingly.

Research Work to Improve Products

"We have improved our plants and equipment to produce better graded and cleaner sand, but we have not stopped with that. We have had many tests made by the laboratory of the Kansas State Agricultural and Mechanical College, at Manhattan, to determine the best grading of material for the uses our products are put to.

"A long series of tests has been made on sand-gravel as concrete aggregate and we are now selling it at a very reasonable price. It is permitted by the city specifications and used in general construction. In doing this we went into competition with our own product, for we are producers of crushed stone for coarse aggregate. We operate a quarry about six miles west of Topeka. The sand-gravel product meets federal-aid highway specifications and sells readily enough. But stone is too expensive for much of the work that is done around here. In many parts of our territory it sells for $3 a ton delivered on the job, and our sand-gravel, which sells for 70c a ton at the plant, will make an equally good grade of concrete, or better, at a lower cost.

"The production of this sand-gravel aggregate, and the production of road gravel, costs us considerably more than the production of sand, as we have to return so much more to the river. But we sell it at a very small advance over the price of building sand, not nearly enough to cover the difference in the cost of production, if we were producing and marketing this material only."

"What about the suit against the Consumers Sand Co. by state and city authorities to compel you to cease pumping near the city of Wichita on the ground that it lessened the city's water supply?" he was asked. The details of this suit were given in several issues of Rock Products in 1927.

"That matter is before the supreme court on appeal, but we have no doubt that it will be decided in our favor, because the decisions in the lower courts were so sweeping and so emphatically in our favor."

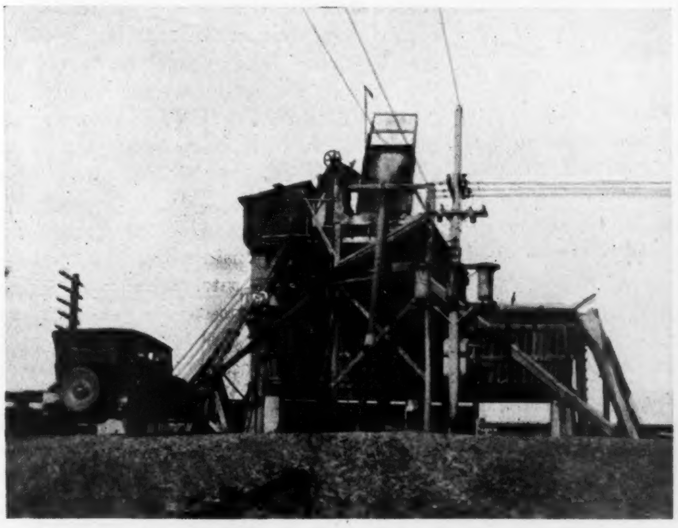
Does Not Favor Road Building Booms

Asked as to the future of the company, he said: "We are optimistic, but we feel that we have a right to be so, the evidence of better business for this part of the country is so strong. We are not looking for a boom of any kind, nor do we want it. We are not in favor of a big highway program with a bond issue or an increased gasoline tax to pay for it. Such things are all right for highly industrialized states where the rapid growth of city populations justifies them. But we do not think it a good policy for an agricultural state like Kansas, with no large cities, to mortgage the future in that way. A big highway program would bring us a lot of new business, and that would be welcome, especially at a time like this when we are spending so much money in development. But we believe that in the end we would be in worse shape, and we feel pretty certain that the state would be in worse shape also.

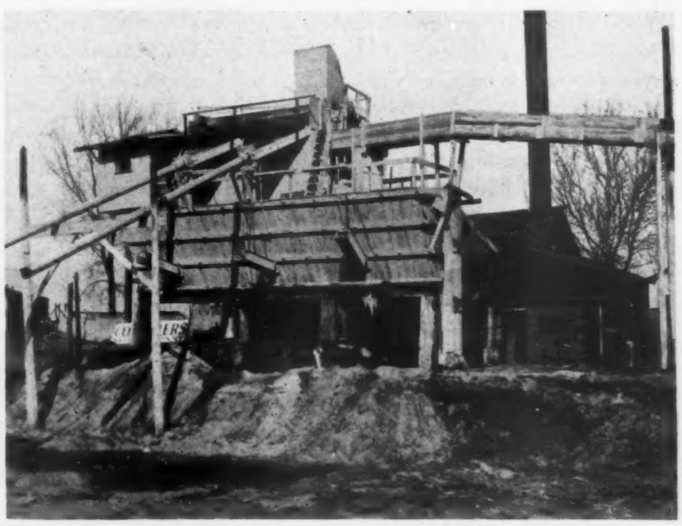
"We must have good highways, of course, and the state is putting in concrete highways on the main arteries of travel. For secondary highways we are sure that sand-gravel roads are all that is needed to carry the traffic that

One of the sand-gravel roads which has given the company a new market

This dredge is typical of all those used in the company's operations



One of the company's older plants at Topeka, Kans.



One of four new plants recently built by the company

will use them for a long time to come. In fact, there have been concrete highways built already that have so little traffic upon them that they do not justify their high cost. For each mile built, 15 to 20 miles of sand-gravel highways might have been built, roads that are serviceable every day in the year and able to carry all the traffic that originates on them."

History of the Company

The Consumers Sand Co. was organized in 1926 from eleven companies which operated about twenty plants. All of these are in the state of Kansas, on the Kansas, Arkansas and Blue rivers, and all are of practically the same type, as they are all dredging operations employing 8-in. and 10-in. pumps. The washing and screening plants required are ot the simplest nature. The pump discharges against a flat screen set at an inclination of about 60 deg. from the horizontal and called a grizzly, although it is more often a heavy wire screen with 1½-in. square meshes. Its purpose is to keep out trash and the occasional large stones that are picked up by the pump. Below this are sand screens which are blanked off to include a good deal of the fines when concrete sand is made, and run open when sand-gravel is to be made, either for highways or for concrete aggregate. Fine sand is settled in bins from the through product of the screen.

The offices of the company are in the National Reserve Building at Topeka, Kan., and the officers are: F. A. Laughead, president; N. S. Wear, vice-president and treasurer; F. H. Gades, vice-president and sales manager; H. N. Richardson, secretary and purchasing agent, and John W. Butler, general superintendent. The annual production is about 1,000,000 tons of sand and gravel a year.

Status of Fight for Home Market for American Cement

THE fight to hold the American market for American cement is going on in towns and cities all over the country and especially in the cities of the south Atlantic coast. As has been noted in previous issues of ROCK PRODUCTS, several city councils have adopted resolutions recommending or demanding that only American-made cement be used on public works. Other cities have recently taken the same action and a resolution to the same effect was introduced in Congress. Opposed to such a policy are the acts of the North Carolina highway commission, which has bought large quantities of Belgian cement, and the mayor and director of public works of Philadelphia. These declined to consider or even to listen to arguments of American cement manufacturers' representatives.

In Congress, Representative Wood of Lafayette, Ind., introduced a resolution (H. Con. Res. 19) and said as, reported in the *United States Daily,* it was designed to make it the sense of Congress "that in all government purchases the American-made materials shall be given preference, all conditions of quality and price, including duty, being equal, provided that in cases where either foreign or domestic materials may be used, government purchasing agencies shall require bidders to specify under each bid the exclusive use of one or other material, or to bid separately on each."

Tariff on Foreign Cement Suggested to Congress

More than 2,000,000 people are out of employment in the United States, Mr. Wood said, and the number could be reduced materially if American materials were used exclusively in building construction and other public works to be undertaken or under way by the government.

Mr. Wood stated that he had introduced the resolution because many of the interpretations placed upon federal statutes and legislative instructions by many government purchasing agents has virtually denied preference of American materials, which come into competition with foreign materials.

After it was stated that contractors are often able to substitute foreign cement for American cement, despite the fact that the cost of cement, by terms of the contract is based on the price of the American product, Representative Burtness (Rep.) of Grand Forks, N. D., suggested that the situation might be remedied by putting an adequate tariff on imported cement rather than by giving a mandate to the excutive departments of the government.

Frederic W. Donahoe of Cleveland, representing the National Builders' Supply Association, spoke in favor of the resolution in behalf, he stated, of 20,000 dealers in building supplies, including cement, plaster, plate glass and brick. These dealers have felt, he said, keen competition from foreign materials and the speculative prices they engender in the market.

J. A. Annin, representing cement manufacturers, said that 10,000,000 bbl. of cement had been imported in the United States in the last six years and the foreign producers were able to undersell the American producers in the Atlantic ports and even other sections of the country.

On April 6 the Building Trades Council of St. Petersburg, Fla., adopted a resolution favoring the use of American made materials, the principal clause reading:

"Resolved, That the St. Petersburg Building Trades Council in meeting assembled do protest the farther use of foreign made material in public buildings and urge that federal, state, county and municipal authorities insist that all contractors on public works use in every instance possible building material made in the United States."

The Georgia Federation of Labor adopted the same resolution at its meeting in Macon, Ga., held April 20.

The Board of Representatives of the city of Tampa, Fla., on April 17 adopted a resolution requiring the use of American made products in preference to materials manufactured in foreign countries on April 17. This was approved by the mayor and it was frankly stated that the purpose of the resolution was to protect the Florida Portland Cement Co., which has its plant in Tampa.

North Carolina Buys 152,000 Bbl. of Belgian Cement

One of the largest purchases of imported cement that has been made recently was that of 152,000 bbl. bought directly from Belgian manufacturers by the State Highway Commissioner of North Carolina, Frank Page. According to the *Raleigh* (N. C.) *News,* Mr. Page said that he did this because the manufacturers of American cement would not furnish it at a price which be considered fair, taking into consideration the recently established freight rate. The difference in price, he is quoted as saying, was 30 cents per barrel.

In Philadelphia, according to the *Philadelphia Public Ledger,* the mayor said:

"'I have been asked to see a couple of lawyers for the American cement interests and I have refused to discuss this cement question with them. I told them that the place for lawyers, if their services were required in the premises, was in court and that if the foreign and domestic cement men had a grievance let them go into court.'"

The same paper says further:

"It was represented to the mayor and Director Murdoch by representatives of the American cement interests that the foreign product is brought from Belgium free of duty and free of freight cost. The Belgian cement comes in free of duty for the reason, it was explained, that Belgium does not put any tariff on American cement. It was represented that the foreign cement is brought here free of freightage because it is shipped as ballast in ships of the Philadelphia Export Co. Landed at a pier in this city, there is no railroad transportation to pay, and the American interests complained that the importers can readily undersell them in this city and make huge profits."

Sand Settling and Devices for Settling and Classifying Sand

Part V.—Commercial Machines—The Automatic Settling Tank

By Edmund Shaw
Editor, Rock Products

WITH the growth of the sand and gravel industry, and especially with the demand for washed and graded materials, there came a new interest in sand washing 10 to 15 years ago, and a number of machines and devices were placed on the market. Some of them have lasted only a short time, and others have become standardized. The main part of the description which follows will be confined to the sand washers now in common use.

In a broad way all of the present sand washers may be divided into two classes, those which settle the sand and allow it to run out of a controlled orifice by gravity, and those which settle the sand and then excavate it by some mechanism. The first class is the cheaper to build and its machines enjoyed a wider popularity at one time than they do now. But they are still standard machines, and where the rather high water content of the product is no disadvantage and the headroom is available, they will do the work as well as machines that are more expensive to buy and to operate.

Examples of this first class are: the tilting tank, Dull cone, Allen cone and others of which many examples are "home-made." All of them have a conical or pyramidal receptacle (or something approaching a cone or a pyramid) to receive the sand. When a certain amount of sand has been settled in the receptacle, a valve at the apex opens automatically, allowing the sand to run out. The opening of the valve may be controlled by the weight of the sand, as it is in the greater number of these devices, or the depth of the sand as in some highly specialized types where classification as much as dewatering is the object of the machine. But all of this class will do some classifying as well as dewatering.

Before describing the machines in detail it will be necessary to explain the principles on which they work. The main principle, that of catching the sand in a receptacle, has already been explained; that is, such settling tanks belong either to surface current or rising current devices, according to the way they are fed. But the removal of the sand by allowing it to flow through an orifice demands further explanation.

Flowing Quicksand

Sand which is so thoroughly saturated with water that all the voids are filled is called *quicksand*. Dry sand and moist sand in a pile behave as soft solids, but a quicksand has the properties of a liquid. A tank full of quicksand cannot support much weight and many persons have been drowned in the quicksands formed by rivers. It will flow like a thick and sluggish homogeneous liquid, and it can be pumped and run through pipes, provided there are no close bends and sharp corners to be passed. It will run out of a hole at a rate that varies mainly with the friction on the sides of the hole and between the grains.

The moisture required to make a flowing quicksand is that which is necessary to fill the voids plus an amount needed to allow the grains a little space to move. The writer has made a great many determinations of the water content of discharges from tilting boxes and like devices and finds that they are usually in the neighborhood of 28% water by weight. With fine sands the moisture content is around 30%, and with coarser sands may be as low as 25%. The moisture content varies with the voids and also with the surface area to be wetted.

This moisture figure, it must be borne in mind, is the percentage of the whole. Thus a 30% moisture content means that the water is 30% of the whole, 70% of the sand plus water being sand and 30% water. If the weight of the sand alone is taken as a base, the water weight is about 43%. A 30% discharge will carry 0.43 lb. water for every pound of sand. A 25% moisture discharge (which may be obtained with concrete sand) will carry 0.33 lb. (33%) water for each pound of sand.

When the sand discharged from any of the box or cone devices has settled it will be found to contain less moisture. Samples of such a discharge will always show free water on top. Where the sand can be drained, as it usually can be in a bin, this is of no moment, but where there is no chance to drain it, as when it has to be handled on a conveyor belt, there will be an excess of water to be disposed of in some way, and generally this is inconvenient. It is better in such a case to choose one of the other types of sand settler that give a dryer product.

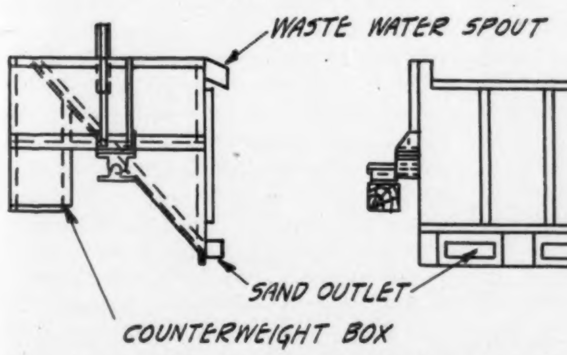


Fig. 14. Sand tank closely resembling the original tilting box

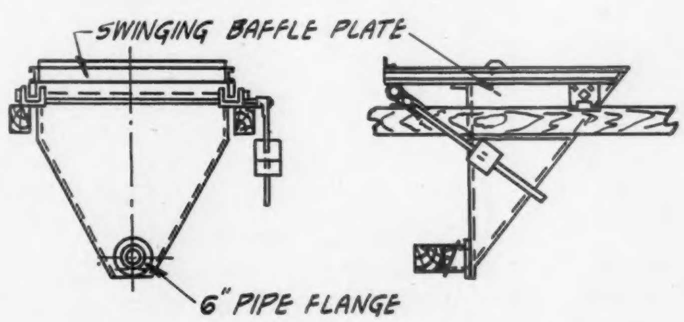


Fig. 15. Tilting tank adjusted by moving weight on lever arm

The Tilting Box

The oldest automatic sand settler is the tilting box, and its name describes it fairly well. It was a box with two compartments, one of which received the sand, while the other held a counterweight. When enough sand had settled to overbalance the counterweight the box tilted and the sand ran out

through a hole that was uncovered by the tilting action. This tilting box was patented long ago in the United States, in 1852, if the writer's memory is correct.

Although no longer made in its original form, commercial machines working in the same way are regularly made and sold. The "balanced type" of steel settling box made by the Stephens-Adamson Manufacturing Co. is an example rather close to the original type. Fig. 14 shows it in side and front elevation. It is substantially made of steel plate and angles with the counterweight box

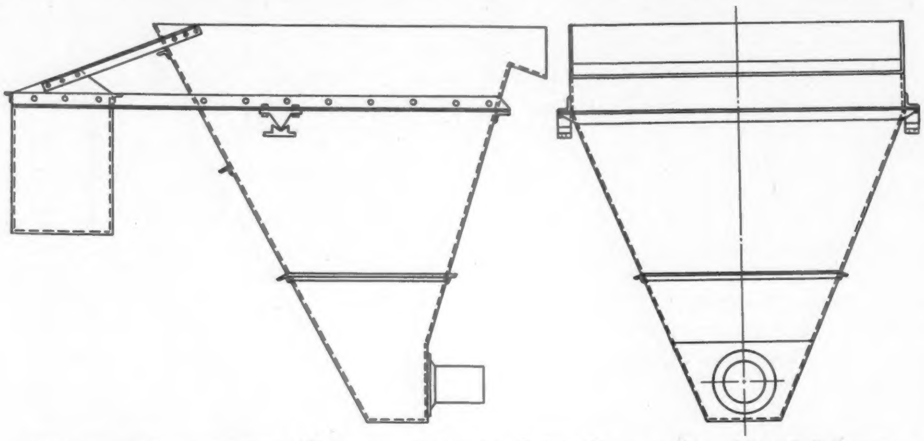


Fig. 18. The counterweight is set out to be definitely on other side of fulcrum

attached to the sand receptacle. The one adjustment is that of the weights that go into the counterweight box. The sliding angle of the bottom is about 49 deg., which is about as low as it is safe to make it for all sizes of sand. This machine is made in two sizes, No. 10 and No. 20. The main dimensions are:

	Length	Width	Overall Height
No. 10	66 in.	66 in.	69 in.
No. 20	89 in.	81 in.	94 in.

The recommendation of the makers is tc use No. 10 with a single row of the smaller screens and No. 20 with one row of the larger screens, or two or three rows of the smaller screens, which they make. The capacity for such a settler may be figured by the method given in Part III and Part IV of this series for any desired split.

This is a thoroughly reliable tank. The writer watched the operation of two of the larger size in the plant of the Dixie Sand and Gravel Co., Chattanooga, Tenn., for some time and was well satisfied with their steadiness and sensitiveness. The men in charge said that they had given no trouble from flooding.

The Stephens-Adamson company also makes an automatic sand settler in which the weight of the sand is balanced by a counterweight on a lever arm. It is adjusted by moving the counterweight (Fig. 15).

The Webster Manufacturing Co. makes a settling tank of much the same type as that just described, that is, having a sand receptacle with a permanently attached counterweight. It has, however, an improved form of valve which should close more tightly when the settler is not discharging than the usual flat piece of belting can close a valve. In the Webster tank the valve is a flat cone on a spindle. The cone gives a wedging fit in the pipe and the snugness of the fit of the valve in the pipe may be regulated by a nut and lock nut. In this way wear may be compensated and a close adjustment of the valve opening may be made without varying the weights in the counterweight box (Fig. 16).

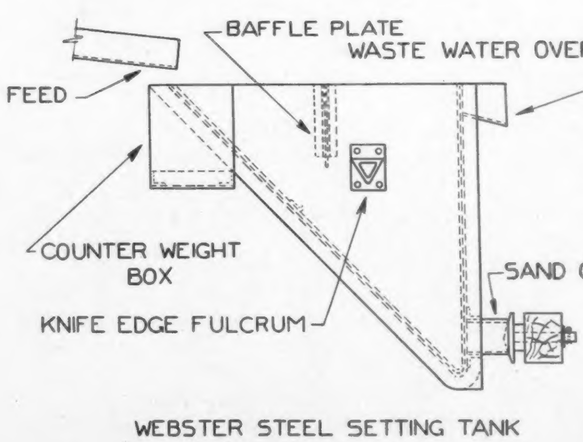


Fig. 16. Tank with special sand outlet in which the outlet pipe is closed upon a flat cone

Settlers with Counterweight on Lever Arm

The original tilting box had the counterweight attached to the sand receptacle. An improvement that suggested itself was to place the counterweight on a lever arm at some distance from the fulcrum. This gave an opportunity to use a smaller counterweight, which meant less inertia to be overcome when the tank was swung from a position of rest and also gave an opportunity of moving the counterweight (instead of changing the load) for adjusting.

F. M. Welch, chief engineer of the Greenville Gravel Cirp., who had designed many sand and gravel tanks and several forms of automatic sand settlers, has finally settled on a tilting tan kof this kind as the most practical type of machine. In a letter to the writer he gives his reasons for this opinion, and they are so interesting that they are reproduced here.

"I found that so far as the sensitiveness of the tank was concerned, the fewer working parts the better, and if a tank could be designed with nothing supporting it except two knife-edged fulcrums it was sufficient to do the work.

"I further found that an ordinary pipe for a valve, attached to the front end of the tank near the bottom, butting against a timber with a piece of belting nailed on the timber for a valve seat, made just as good a valve as any, provided care was taken to see that the valve fitted tight when closed.

"I further made up my mind that the mistake which everyone was making, including myself, was in building a tank so that the compartment containing the sand was not definitely on one side of the fulcrum and the counterweight definitely on the other side of the fulcrum. I woke up to the fact after seeing a few clumsy wooden tanks which were working perfectly, and the secret of their success was in these two points.

"Therefore I set out to design a steel tank of as simple construction as possible, with

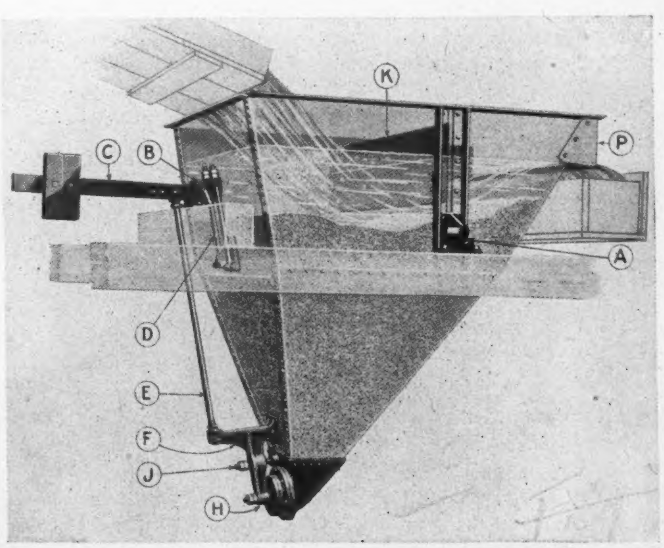


Fig. 18. Both valve and tank move in this form

nothing but knife-edge fulcrums on both sides to support it (thereby practically eliminating friction) and seeing to it that the sand was definitely on one side of the fulcrum and the counterweight on the other. After designing such a tank, and building a few of them, we found that it was so sensitive that it would tilt when a handful of sand was thrown into the sand compartment."

This settler is made by the Greenville Gravel Corp. of Greenville, Ohio, in two sizes called "five-foot tank" and "six-foot tank." It is shown in side and end elevation in Fig. 17. The five-foot tank is 5 ft. long and 5 ft. wide and has an overall depth of 5 ft. 6 in. The six-foot tank is 6 ft. 6 in. long, 6 ft. wide and has an overall depth of 7 ft. Both are constructed of heavy steel plate and angle irons.

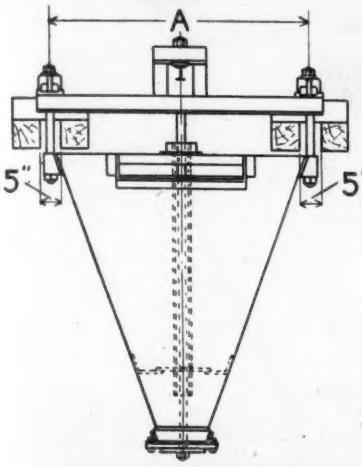


Fig. 16

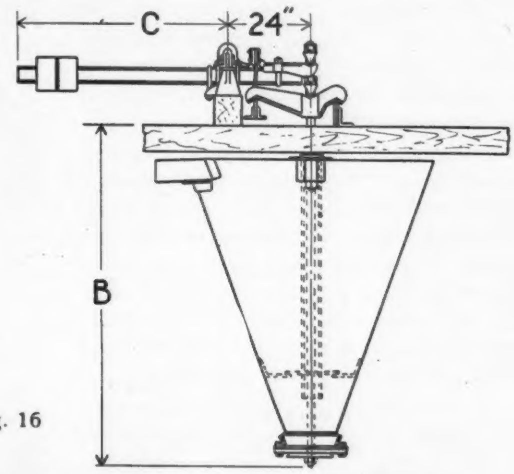


Fig. 19. Both cone and valve descend but the valve has greater motion

The shape is roughly an inverted pyramid and it has several sliding faces. The least inclination of any of these is 62.5 deg., which, according to the writer's experience, is enough to prevent "hanging in the corners" and should insure a steady discharge with any sand ordinarily collected in a sand plank. No recommendations were given by the makers as to the sizes to be used with different quantities of water or sand.

Settlers with Moving Valves

It was found that the tilling box might be constructed so that the tilting movement would open the valve at the same time it tilted the tank, thus giving twice the valve opening for the same movement of the tank. A number of machines embodying this idea have been built and placed on the market, but some of them employed such complicated systems of levers and had so many bearings that they would not work well after the bearings became a little worn and so they went out of use.

However, one type of settler using this principle has proven itself efficient and well able to withstand the rough usage of a sand plant, and a great many of them are in successful use. This is the Telsmith pivoted tank, made by the Smith Engineering Co., Milwaukee, Wis. The valve mechanism is simple and it is placed out of the way of sand and spill so that it does not wear readily. The main adjustment is by a counterweight sliding on a bar, but a further adjustment of the valve motion may be had by changing the position of one link. The fit of the valve may be adjusted by screws and nuts.

The makers guarantee that with sand containing not more than 25% of minus 20-mesh the product will not contain over 5% of free moisture and that the total moisture will not exceed 25%.

This settler is made in four sizes and the following from the maker's catalog gives the capacities:

Number of sand tank	5	6	7	8
Cubical contents, cu. ft.	50	80	120	155
Capacity in coarse sand, cu. yd. per hour, about	15	25	35	50
Capacity in fine sand, cu. yd. per hour, about	7–10	12–16	18–23	25–30
Weight of tank empty, lb.	750	1200	1450	1650
Weight of tank full, lb.	4700	7500	11000	14000
Water capacity, g.p.m., catching coarse sand	300	500	800	1100
Water capacity, g.p.m., catching fine sand	225	375	525	825
Pitch of feed launder or flume, recommended	5 to 10 deg.	5 to 10 deg.	5 to 10 deg.	5 to 10 deg.
Width of feed launder or flume, recommended	3 ft. 6 in.	4 ft. 0 in.	4 ft. 6 in.	5 ft. 6 in.

The writer has seen a great many of these tanks in various parts of the United States and has heard no complaint from any of the operators concerning them. They were working well on fine sands as well as on coarse.

Cones with Automatic Discharge

The settlers so far described are of the hopper or inverted pyramid type. The cone has some advantages over these shapes as a sand receptacle, at least from a theoretical standpoint, for it has no corners in which sand can lodge. This was a trouble experienced with earlier forms of settlers which seems to have been pretty well eliminated in the later types. The desire to cut down head room made the earlier builders use such flat sliding angles that the angle in the corner was less than the angle of repose. And there is a disposition of settled sand to hang in corners even where the angle is steep that must be recognized.

Of the cone types of settlers the Dull cone, made by the Link-Belt Co., is perhaps the best known, as it has been in use at least as long as any of them. It works by the weight of the sand, but it does not tilt; it moves vertically up and down. It is balanced by a counterweight and the same counterweight also controls the movement of the valve which is attached to a longer arm. As the cone goes down, the valve goes down, too, but it goes farther, which leaves an opening through which the settled sand escapes.

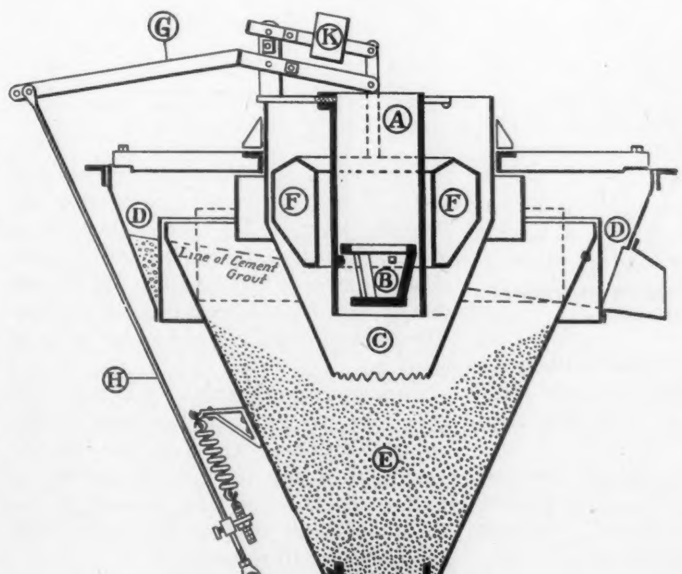


Fig. 20. Cone with valve actuated by volume of sand

The adjustment is wholly by moving the counterweight on its arm and when adjusted the cone will run without further attention unless it is fed with a different kind of material or a greatly increased or decreased quantity. As with all sand settlers of this type, it is a

fairly good rough classifier and can be used for such work as throwing out unwanted fines from concrete sand.

The cone is shown in front and side elevation in the illustration (Fig. 19), which is from the makers' catalog. From the same source is the table showing the dimensions and weights of the different sizes.

Size	A	B	C	Weight
60 in. diam.	63	90	79½	1900 lb.
72 in. diam.	75	100	91⅓	2250 lb.
96 in. diam.	100	138	92	4000 lb.

Regarding the capacity, the makers say:

"The 60-in. separator will handle up to 60 gal. of water per minute. The 72-in. separator will handle up to 1000 gal. of water per minute. The 96-in. separator will handle 1800 gal. per minute. The mixture going into the separator should contain, by volume, not over 20% solids."

It would be the writer's opinion that more of these sand separators are in use than any other form of sand settler in the sand and gravel plants of the United States. They work satisfactorily on all classes of material except the finest sands, and it is the writer's experience that none of the automatic sand settlers work well on that.

Volume of Sand Used to Operate Valve

In the examples given the weight of the settled sand has been used as the operating

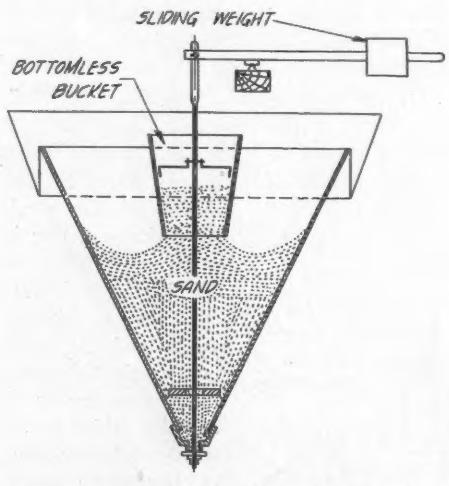


Fig. 21. Weight of sand in bottomless bucket opens valve

force. But the volume of the settled sand may also be used and this done in the Allen cone, made by the Allen Cone Co., New York.

The Allen cone is designed as a classifier rather than a dewaterer, although it may be used as a dewaterer, of course. But the effort of the designer was to maintain constant conditions as much as possible so that the classification would not vary from differences in the amount of solids fed. The settled sand forms a basin which is maintained by the action of a float controlled valve.

As this machine is not quite so easy to understand as the tilting devices, a cut, Fig. 20, from the makers' catalog has been used, together with the description given, as follows:

"The feed stream enters the inlet spout *A* (referring to the cut), impinges on the baffle *B* and passes through the trunated cone *C* into the cone *E*. The feed stream water and the smaller solid particles carried with it flow over the lip of the cone *E* into the launder *D*. The solid particles which do not overflow settle in the cone *E*, forming the basin in which the classification takes place. When sufficient particles have settled in the basin to *obstruct* the flow of the feed stream water from *C* into *E*, the water rises in *C*, carrying with it the float *F*. By means of the lever *G*, the rod *H* and the valve arm *I*, the ball valve *J* is removed from the spigot opening through which the classified particles are discharged from the cone *E*."

The operation is continuous and after the machine is in steady operation the classifying basin is maintained at a uniform level and at practically the same shape, and this gives uniform classification.

A machine of this sort may be very useful where rigid specifications of the grading of the sand have to be met. For example, some specifications say that only a small percentage of the sand shall pass 50-mesh. The following, from the Allen Cone Co.'s catalog, shows how such a specification would be met by classifying a too fine sand so as to throw out everything finer than 50-mesh:

ORIGINAL SAND

Size	Cum. %
On 8 mesh	4.5%
On 14 mesh	10.5%
On 28 mesh	29.4%
On 48 mesh	69.8%
On 100 mesh	94.6%
Through 100 mesh	5.4%

CLASSIFIED SAND

Size	Cum. %
On 8 mesh	8.8%
On 14 mesh	20.7%
On 28 mesh	55.1%
On 48 mesh	99.6%
On 100 mesh	100.0%

The fineness modulus of the original sand was 2.14 and the fineness modulus of the classified sand is 2.84. Calculation shows about 65% of the original sand went into the classified sand or that less than 5% of sand coarser than 50-mesh went into the overflow. This is very close work for any type of classifier.

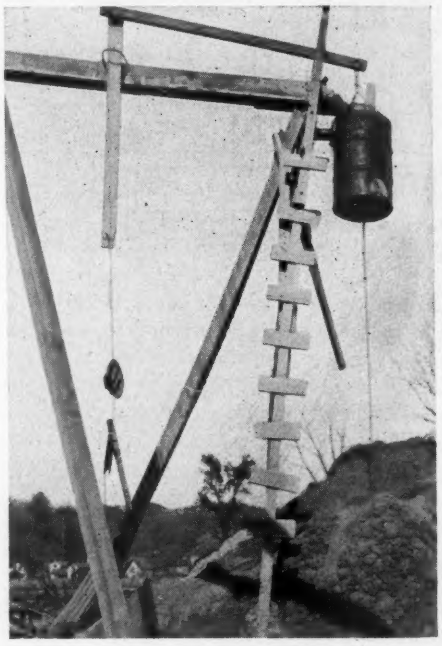
Arrangements are made so that the classifying area may be changed in order to vary the classification. The one essential for close work is that there should not be too much variation in the feed, especially in the amount of water fed, but this applies with equal force to all classifiers.

The Allen sand tank is a pyramidal form of the machine especially designed to handle large flows and make a rougher classification.

Both machines are made in several sizes and the largest will handle heavy tonnages. The sizes that would ordinarily be used in sand plants run from 4 ft. 6 in. to 8 ft. in. diameter. Capacities for ordinary work run up to 50 tons per hour of classified sand produced.

Various Automatic Machines

A great many forms of automatic sand settlers have been invented, but the above includes those best known in the sand and gravel industry. In the mining industry three or four others are in common enough use to be mentioned. Those described in Taggert's Handbook of Ore Dressing are: The Mount Lyell automatic diaphragm cone, the Caldecott cone with automatic discharge, the Boylan cone classifier and the Wood deslimer. The Mount Lyell cone (Fig. 21) has an open bottom bucket on the valve rod which receives the sand. This settles in the



A simple form of automatic settler made from oil barrel

cone and afterward piles up in the bucket until the weight is sufficient to pull the rod down and open the valve. It does not seem to have come into general use, although the principle is sound, as the writer has proved experimentally.

The Boylan and the Woods machines are forms which are operated like the Dull cone except that they use different systems of levers.

Where small quantities of sand and water very simple forms of tilting tanks and falling cones may be used.

About the simplest device of the kind that has been noted was made of an oil barrel hung from the end of a weighted lever. A hole in the bottom is closed by a pointed stick nailed to the sand flume until the weight of the collected sand causes the barrel to sink. It was fully described in "Hints and Helps," ROCK PRODUCTS for February 18, and the picture is reproduced here.

Generally such devices are home made and they work pretty well until an attempt is made to introduce them in large scale

models. Then friction on the valve and rod and some other factors make them unreliable.

Automatic settlers are simple enough, but they require some knowledge of sand settling to be operated for the best results. Most of them are rising current classifiers of the type shown in Fig. 9, Part II of this series and discussed then. The current flows down under a baffle and rises on the upper side. Hence if the baffle is moved *toward* the overflow lip coarser particles are thrown into the overflow until a certain point is passed, after which moving the baffle toward the overflow lip sends finer particles into the overflow. The position of this baffle is fixed in many types, but it can be made movable and moving it will often make just the change that is needed to throw the right sizes of particles into the classified sand.

Coming Meeting of American Society for Testing Materials

THE annual meeting of the American Society for Testing Materials will be held at Atlantic City, N. J., June 25 to 29. The meetings given to discussions and reports interesting to the rock products industry will be held June 28 and 29.

Cement

Committee C-1 (Cement), P. H. Bates, chairman, will discuss the lack of concordance of results of the chemical, fineness, consistency, time of set and strength tests made over a period of two years on 32 cements by 47 different laboratories. This subject was taken up at the Washington group meeting held in March. Data were secured from the usual test specimens and compression test specimens made from a neat paste with 42% of water. An attempt is made to correlate the results of the chemical analyses with those of the physical tests and also to show the relationship between consistency, fineness and flow of concrete.

Some of the papers which will be presented are:

"A Plastic Mortar Compression Test for Cement," by Edward M. Brickett. The program says that the results of compression tests on plastic mortar gaged to the same water-cement ratio as the corresponding concrete indicate this to be the most promising basis for a specification for portland cement.

"Volume Changes of Portland Cement as Affected by Chemical Composition and Aging," by Alfred H. White. This is to be a further exposition of the well-known work of Professor White on volume changes in cement and concrete.

"Resistance of Portland Cement Concrete to the Action of Sulphate Waters as Influenced by the Cement," by D. G. Miller. Results of physical and chemical tests on cylinders stored in a 1% solution of sodium sulphate and also in natural alkali waters.

The concrete and aggregate committee, C-9, Cloyd M. Chapman, chairman, will present a mode of procedure for design of concrete mixtures by the water-cement ratio method. It will also submit revisions of several tentative standards and present a new test method.

Papers on concrete include: "The Determination of the Workability of Concrete" (using a mixer and finding the work required to mix a bag of cement to make concrete), by W. F. Purrington and H. C. Loring.

"Measurement of the Workability of Concrete," by G. A. Smith and George Conahay.

"Permeability of Concrete," by Ira L. Collier.

"Accelerated Freezing and Thawing Tests of Concrete," by C. H. Scholer.

"Tension, Compression and Transverse Tests of Plain Concrete," by H. F. Gonnerman and E. C. Shuman. This will interest aggregate producers, as the effects of size and grading of aggregate are taken into consideration.

"The Effect of Several Mechanical Features of Testing on Determination of Flexural Strength of Plain Concrete," by T. F. Willis. (Shows a variation of as much as 250 lb. due to type of test chosen.)

"Experimental Tests of Concrete Steel Bond," by L. N. Edwards and H. L. Greenleaf. (The effect of the sand aggregate, as well as other factors, is noted.)

Lime

Committee C-7 (Lime), H. C. Berry, chairman, will present its report recommending for adoption as standard tenative definitions of terms relating to lime. It presents revisions of the standard specification of hydrated lime for structural uses.

At the Washington group meeting this committee slightly modified its method for measuring the plasticity of lime. It also gave consideration to the proposed joint committee on specifications for plastering from various organizations interested in lime, gypsum and cement plasters, and finally decided to have a letter vote of the whole committee to see whether the committee would care to participate or not.

Gypsum

Committee C-11 (Gypsum), J. W. Ginder, chairman, will report that laboratory tests of gypsum-anhydrite mixtures as a retarder in concrete have given favorable results and now mill tests will be made. Investigations of gypsum-fiber concrete will be mentioned. Revised specifications for Keene's cement and for calcined gypsum for use in dental plasters will be presented.

The investigation of gypsum-fiber concrete was one of the matters considered at the Washington meeting and a program of tests to determine the working stresses was approved. The value of gypsum-anhydrite mixes as a retarder in portland cement was also discussed.

At the Washington meeting the gypsum committee, like the lime committee, considered the formation of a joint committee on plastering. It was voted to approve the formation of such a committee and to participate in its activities, provided the plan met with the approval of the industry.

Aggregates and Road Materials

Committee D-4 (Road and Paving Materials), Julius Adler, chairman, will present a new abrasion test for gravel and a new recommended practice in bituminous paving plant inspection. Its report proposes a revision of five tentative standards and recommends advancing to standard the decantation test for sand and fine aggregate. Proposed specification for concrete pavement and bases will be submitted and results of co-operative tests of the committee on materials of the American Association of State Highways Officials and the report of the distillation section of the committee.

"Deval Abrasion Tests of Aggregates," by Stanton Walker, will be a paper giving results of work on gravel, crushed limestone, slag, granite and sandstone. "A Study of the Abrasion Test for Gravel," by A. E. Stoddard, will discuss results of tests from which a revised form of test was selected as giving results equivalent to those of the standard abrasion test for rock.

The technical committee on coarse screens considered a series of tests on coarse screens, which has been conducted by the committee at the Washington meeting. The purpose was to see whether round or square hole screens gave the more consistent results. Other factors considered were the relative cost of installation, costs of replacement, the degree of accuracy of the screens as manufactured, the ability to maintain accuracy in use, the length of time required to make tests and to secure a satisfactory end point.

Concrete Products and Sand-Lime Brick

At the Washington meeting Committee C-3 (Brick), T. R. Lawson, chairman, discussed tentative specifications for concrete brick (revised) and sand-lime brick. These will be submitted at the June meeting.

The report of Committee C-6 (Drain Tile), of which Anson Marston is chairman, will be only a report of progress. The joint committee on concrete culvert pipe will also submit a report. Two papers on concrete pipe will be submitted, one by W. J. Schlick, discussing the national standards for pipe; the other, by F. B. Lysle, discussing the A. S. T. M. specifications for sewer pipe. It shows the lack of uniformity of the loading requirement.

General view of the quarry floor and face at the Dolese Bros. Co. plant near Richards Spur, Okla. Note the marked dip indicating the dome formation

Oklahoma's Largest Crushed Stone Operation

Plant of the Dolese Bros. Co. at Richards Spur Produces Nearly 4000 Tons Daily

IT is somewhat surprising to find one of the largest crushed stone producing companies operating plants along the southern border of Oklahoma, far from any large city markets. The Dolese Bros. Co. of Oklahoma City and Chicago operates three good-sized plants there. Two of them, the Bromide plant and the Big Canyon plant, have capacities for about 2000 tons daily and the third, at Richards Spur, about 25 miles from Lawton, Okla., has a capacity for 4000 tons daily and in the peak of the season actually produces 3800 tons.

The nearest city of importance to the last named quarry is Oklahoma City, 95 miles away and a town of perhaps 125,000 people. Wichita Falls, Texas, with about 75,000 people is about the same distance. But these towns are doing plenty of building and a number of towns of 10,000 to 35,000 people, some nearer and some farther away, furnish an additional market. Concrete and asphalt highways are being built in several counties in Oklahoma and Texas, so that there is a good-sized market for the product although it covers a large territory. The average distance that shipments travel from the Richards Spur quarry is almost 100 miles, and shipments are regularly made to one point 300 miles distant.

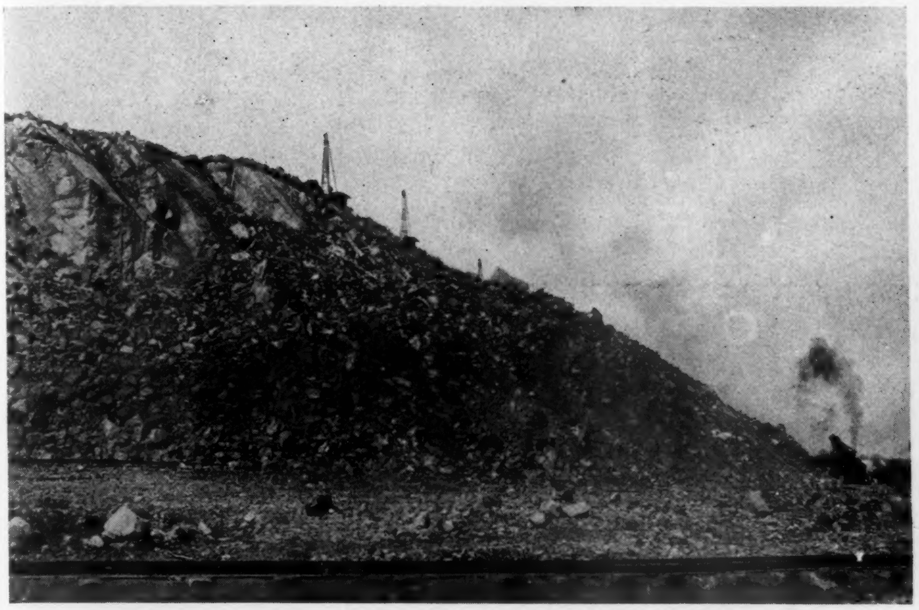
The Richards Spur quarry was opened in 1905 and is the oldest of the company's Oklahoma operations. About three years ago rebuilding of the old crushing plant was begun and carried on, in such a way as not to interfere with production, until the latter part of 1927. So the plant is now a new plant as regards the building and much of the equipment.

Quarry Location

The deposit is in the hills that form the lower part of the Wichita mountains a few miles distant from Mount Scott, the highest peak of that section. Mount Scott is all granite. A creek nearby divides it from the hills near Richards Spur which are all limestone.

The quarry is in one of these hills that rises 300 ft. above the surrounding country. The hill is a dome. The strata dip away from the center as if the dome had been formed by some force that pushed up the central part. This unusual lie of the strata has made successful drilling and blasting something of a problem and on two occasions rock slides have followed blasts, causing some damage to equipment. But the method employed at present has given a good tonnage of well fragmented rock without any slipping of the strata. The last shot fired was successful in every way and it brought down about 300,000 tons.

The quarry face has a length of almost a mile as it has been cut through the hill and it is 110 ft, high where it is now being worked. At this point it slants back so that the top is about 70 ft. back of the foot. The strata have about the same dip as the face.



A shot in the slanting face, with vertical drill holes and horizontal toe holes

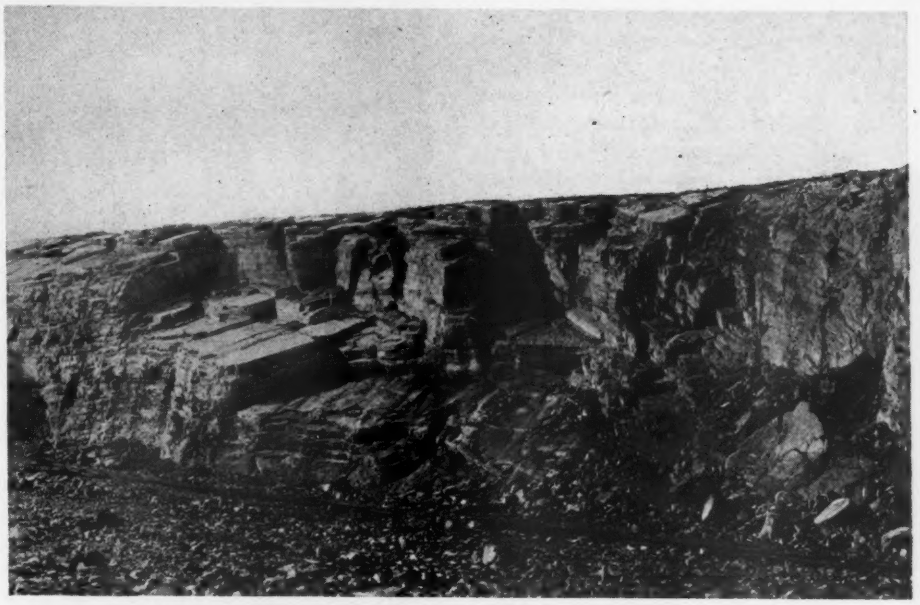
The system of quarrying worked out by W. J. Briggle, the quarry superintendent, is a combination of vertical well drill holes and horizontal holes of smaller diameter in the toe. The well drill holes are put down by three Sanderson-Cyclone drills and they are started as near the face as possible, generally about 6 ft. back. These holes are carried 2 ft. below the quarry floor. The toe holes are put in as flat as it is possible to drill them, which is about 6 deg. or 8 deg. from the horizontal. A Denver Rock Drill Co.'s hammer drill of the intermediate size puts in these holes, the usual depth being 22 ft. Hollow steel with a cross bit is used and the exhaust is turned into the drill in the place of pressure water. These toe holes are spaced fairly close together (from 3 ft. to 4 ft.) and every other hole is sprung before loading.

Drilling Practice

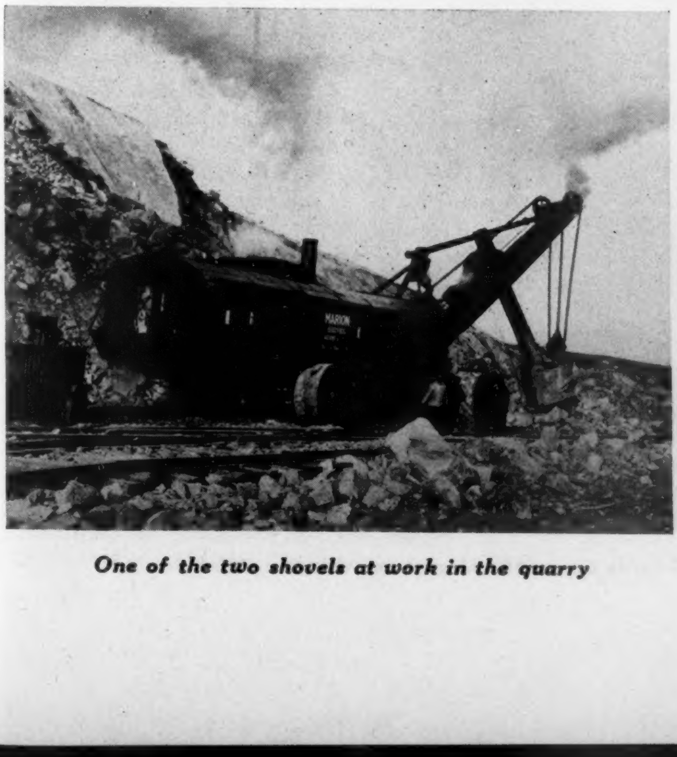
Formerly tripod drills were used for the toe holes and 15 ft. to 20 ft. was considered a fair day's work. The Denver drills drill an average of 140 ft. per day and have drilled as much as 190 ft. in a day. Air is furnished by a Sullivan 250-ft. compressor.

The well drill holes are set 14 ft. apart and are not sprung. A charge of 500 lb. of 80% powder is placed in the bottom with 60% powder above. Each hole takes from 900 to 1300 lb. of powder as a charge. The toe holes are also loaded with 60% and 80% powder, after springing. Cordeau is used in all the holes and the firing is by electricity, but the toe holes are set to go ahead of the well drill holes. This relieves the burden on the bottom of the well drill holes and gives them a chance to break out instead of breaking back.

In the next shot Mr. Briggle says he thinks he will try some shorter well drill holes back of the long holes which will maintain the face at a better grade and break the rock into smaller pieces.

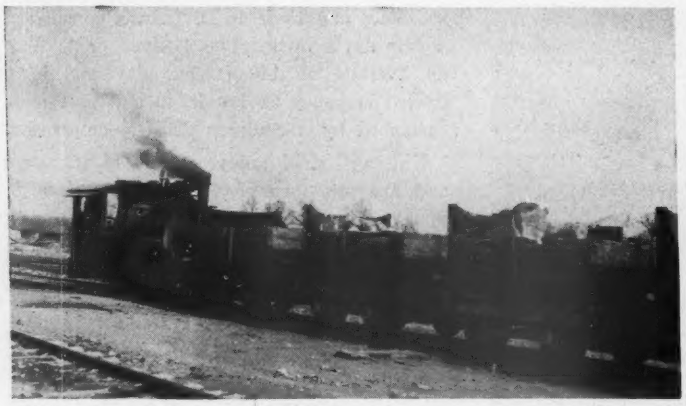


A portion of the quarry showing the folded strata

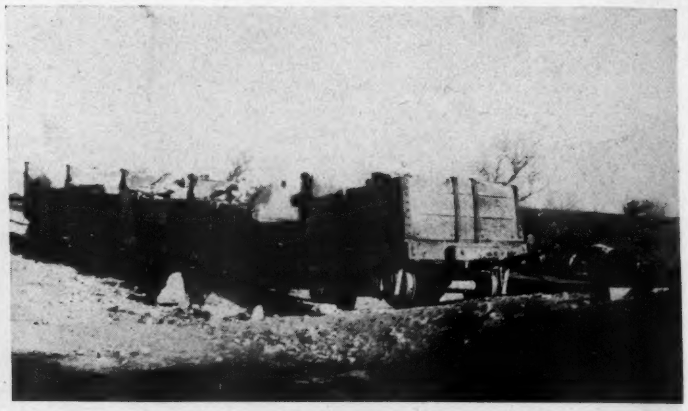


One of the two shovels at work in the quarry

Building a new boom for one of the steam shovels



Train of specially designed end-dump quarry cars



Quarry cars ready to be pulled up the incline to the crusher

Loading in the Quarry

The broken rock is loaded by two shovels, one Marion and one Bucyrus both with 3½-yd. dippers. These are on traction wheels instead of caterpillars, as this mounting is considered better for the rock and the quarry floor that has to be traveled. Steam is preferred to electricity in this company's quarries, as it finds that steam power is faster and, the cost of current and other things considered, that it is quite as economical. Being so far from the conveniences of large towns, the company maintains a well-equipped machine shop and employs mechanics who can make or repair almost anything that is needed. They were overhauling one of the shovels when the plant was visited and making a new boom for it.

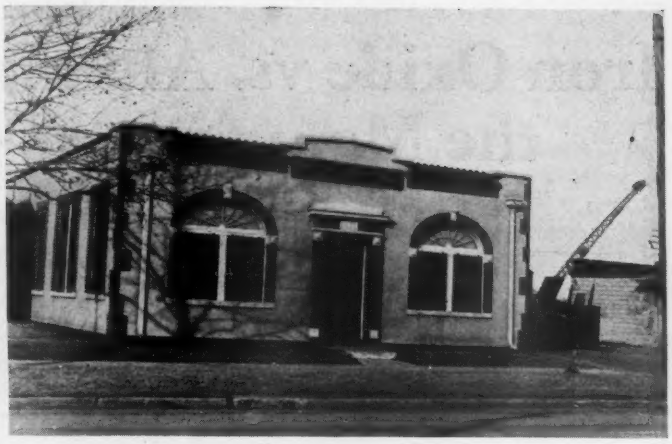
The crushing plant, showing the arrangement of loading tracks

The cars into which the shovels load are of an end-dump type which was designed by the company's engineers. The end is closed with a swinging door held in place by a bar that drops into a slot. The car is tipped up at about 45 deg. to dump and as it is pulled into the dumping position the end of the bar passes over a piece of rail that lifts it out of the slot, which allows the gate to swing free. The door closes and the bar latches automatically when the car is dropped back on the rails by the hoisting engine.

These cars hold five tons and 25 of them are in service. They are pulled in from the shovel in trains of six or eight cars by three 20-ton Davenport steam locomotives. The quarry track system is somewhat unusual. There is a loading track near the face and another roughly parallel to it which connects with the plant track. These parallel tracks are connected by switches to a dead

A general view of the crushed stone plant at Richards Spur—the largest operation in Oklahoma

The retail yards of Dolese Bros. Co. in Oklahoma City



The Oklahoma City office of the company

end long enough to hold a train. With these two connected tracks, trains can pass at the ends or go in and out on either or both sides. The effect is about the same as with a circular track and a car off the track at one shovel does not block the trains from serving the other shovel. All tracks are standard gage and of 75 lb. rail.

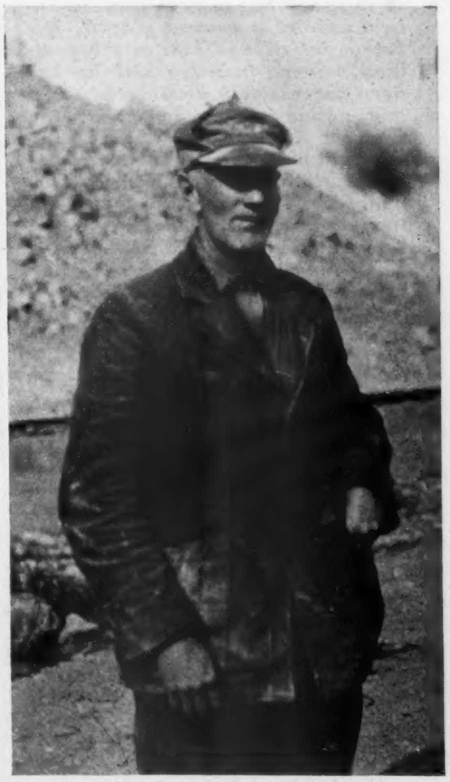
The locomotive drops its train of full cars at the bottom of an incline which leads to a point above the primary crusher, and picks up a train of empties to return to the shovel. The full cars are pulled up the incline by a double friction belted hoist of a type much used in the Joplin zinc fields. It was built by the company. The cars are dumped directly is a No. 21 Traylor that can take a piece 42 x 84 in. without preliminary breaking. A Curtis air hoist above it is used for turning the larger pieces. On account of the large size of the crusher little secondary shooting is required in the quarry, a box a day being about the powder required for block holes.

Crushing and Screening

From the primary crusher the rock goes to one of the largest bucket and belt elevators that has ever been installed in a stone plant. It has a belt 50 in. wide on which are placed buckets full 50 inches long and 16 in. wide and deep. The belt is 12 ply rubber, made by the Independent Rubber Co., and the buckets are set on it as closely as possible. This elevator is on 62 ft. pulley centers, and the elevator which takes the discharges of the secondary crushers is of the same width, has the same size buckets but is on 70 ft. pulley centers.

The 62 ft. elevator lifts the stone to the 60 in. by 18 ft. scalping screen which has perforations from 2¾ in. to 1½ in. All products of this screen are recrushed. The fines go to a No. 4 Allis-Chalmers crusher, the intermediate sizes to two No. 5 crushers, one of Allis-Chalmers and one of Austin makes, and the oversize goes to a No. 8 Allis-Chalmers crusher. These crushers are set farly close together so that all the discharges can be chuted to the foot of the 70-ft. elevator previously described.

This lifts the crushed rock to the two finishing screens, which are 24 ft. long and 60 in. in diameter, and like the scalping screen they are of Allis-Chalmers make. They have 1-in., 1¾-in. and 2¾-in. perforations. All products go to bins except those passing the 1¼-in. holes and 1-in. holes



W. J. Briggle, superintendent

which are sent to two Allis-Chalmers shaking screens. These are of the double deck type, the decks shaking in opposite directions to balance the vibration. The decks are 6 ft. by 10 ft. and are covered with wire cloth, the lower decks having 4 mesh cloth to take out the screenings. These are sold to the railroads for filling and finishing tracks as there is little or no demand for agricultural limestone in that part of the country.

For recrushing there are two sets of rolls fed by conveyors from the bins. The roll products are sent to the 70-ft. elevator which lifts them to the finishing screens and the shaking screens. These rolls are of the type which is much used for crushing zinc ore in the Joplin field.

General Electric motors are used throughout the plant, the largest being the 200 hp. motor that drives the primary crusher. Power is purchased. The Gill bit is used on the well drills, made on a Gill sharpener which is in the machine shop.

Storage is carried in stockpiles at the plant and a Thew shovel with a ¾-yd. dipper is used for reclaiming.

Unusual Track System

The Oklahoma office of the company is at 13 West 13th street, Oklahoma City. Here the company has its own office building and retail yards and garage, as it maintains a fleet of trucks for local deliveries. Sand is produced at a small dredging plant on the river near the city for local trade. Although the sand appears rather fine the highway department reports that it tests 114% Ottawa and that it is an excellent sand for all concrete work.

Besides the Oklahoma quarries mentioned, the company operates quarries in Texas and Kansas and one in Iowa which is the largest in that state. The general office of the company is in Chicago.

Ash Grove Cement Plant Has Tulip Show

OUT at the Ash Grove Lime and Portland Cement Co.'s plant at Chanute, Kan., are about 2500 tulips in blossom at the present time. Visitors who drive in and make the circle around the office building can see multi-colored tulips in full blossom.

The landscaping around the plant makes it one of the beauty spots in southeast Kansas. Carl T. Hansen is the gardener in charge. Mr. Hansen and his assistants have transformed barren tracts of ground into well-ordered flowerbeds, and drives are lined with trees and shrubbery.—*Chanute* (Kan.) *Tribune*.

Iron Oxide vs. Alumina as a Fluxing Agent in the Manufacture of Portland Cement

The Results of Some Original Experiments at La Tolteca Cia. de Cemento Portland, S.A., Tolteca, Mexico

By Alton J. Blank

Chief Chemist, La Tolteca Cia. de Cemento Portland, S. A., Tolteca, Hidalgo, Mexico

IT IS OF SPECIAL INTEREST to note that where several authors on the manufacture of portland cement have written statements to the effect: "That the aluminous constituent of the cement raw mixture has the same fluxing action and effect on burning conditions in the cement kiln as does the iron oxide constituent," and where one author in particular has only recently stated: "That cements rich in iron oxide require a higher burning temperature," there have appeared to date (as far as is known to the writer) no published disagreements to the above assertions.

Experiments conducted over an extensive period have resulted in our finding that the above conclusion *do not* hold true in so far as our particular case is concerned.

For purposes of explanation and comparison there is shown below the analyses of four samples of clinker, which are representative of the normal clinker, as heretofore manufactured by us. These are referred to as Example No. 1.

CHEMICAL ANALYSIS CLINKER—EXAMPLE NO. 1

	No. 1	No. 2	No. 3	No. 4
SiO_2	20.82%	20.90%	20.60%	21.00%
Al_2O_3	7.63%	7.74%	7.57%	7.56%
Fe_2O_3	2.97%	2.90%	3.13%	2.94%
CaO	64.66%	64.54%	64.53%	64.58%
MgO	2.18%	2.19%	2.18%	2.17%
SO_3	0.48%	0.56%	0.52%	0.62%
Ign. loss	0.30%	0.40%	0.40%	0.38%
Alkalies, etc.	0.96%	0.66%	1.07%	0.75%
$\frac{SiO_2}{R_2O_3}$	1.96	1.96	1.92	2.00
$\frac{CaO}{SiO_2 + R_2O_3}$	2.05	2.04	2.02	2.05
$\frac{SiO_2}{Al_2O_3}$	2.72	2.70	2.72	2.77
$\frac{Al_2O_3}{Fe_2O_3}$	2.56	2.66	2.41	2.57

The output of the above clinker from the kilns is to be considered as normal.

The appearance of the clinker may be stated as being greenish in color and ranging in size from 1½ in. down.

The average specific gravity is 3.15.

The average clinker soundness is 75.0%.

The average clinker, when ground to cement with the proper addition of gypsum, gives the following average results:

The Author

THE author of this article, and of a preceding one on "Changes Undergone by Cement Materials Along the Length of a Kiln," in Rock Products, March 17, 1928, is a son of John A. Blank, general superintendent of the Welleston Iron Furnace Co. and its subsidiary, the Superior Portland Cement Co., Superior, Ohio. The author was born at Cementon, Penn., and, so to speak, has always lived "within a mile of a cement plant." His father introduced him to the portland cement industry and he has been successively assistant chemist and acting chief chemist of the Georgia Cement and Stone Co., assistant chief chemist of the Phoenix Portland Cement Co. at Birmingham, Ala., and for going on three years, chief chemist of La Tolteca company in Mexico. He is still in his twenties, therefore one of the youngest chief chemists in the industry; and judging by his contributions, both published and those soon to be published, our author is one of the most inquisitive and enterprising of chief chemists, as well.—The Editor.

The average cement soundness	95.0%
LeChatelier expansion	3.0 m.m.
Specific gravity	3.12
Tensile strength, pounds per square inch	*1:3 sand mortar*
3 days age	228
7 days age	301
28 days age	399
3 months age	409

The fuel oil as burned in the kilns has the following characteristics:

Gravity Baumé	13.3
Specific gravity	0.9768
Pounds per gallon	8.13
B.t.u per pound	18,000
B.t.u. per gallon	146,340

The fuel oil consumed per barrel of clinker burned averaged 9.8 gal., which, when calculated to B.t.u.'s, equals 1,434,132.

It may be asserted here that the above experiment under heading of Example No. 1 consisted of a condensation of results obtained over a period of slightly more than one year.

Example No. 2—Mixtures of highly aluminous materials to our normal raw materials gave us a type of clinker which, in this case, may be considered as being "high alumina." There is shown below the analyses of four samples of clinker which are representative of this "high alumina" clinker as manufactured by us. These are referred to as Example No. 2.

CHEMICAL ANALYSIS CLINKER—EXAMPLE NO. 2

	No. 1	No. 2	No. 3	No. 4
SiO_2	20.64%	20.80%	20.84%	20.64%
Al_2O_3	8.15%	8.36%	8.44%	8.23%
Fe_2O_3	2.65%	2.64%	2.62%	2.77%
CaO	64.01%	64.50%	64.72%	64.90%
MgO	2.22%	2.18%	2.16%	2.15%
SO_3	0.52%	0.48%	0.54%	0.58%
Ign. loss	0.32%	0.40%	0.30%	0.38%
Alkalies, etc.	1.47%	0.55%	0.30%	0.24%
$\frac{SiO_2}{R_2O_3}$	1.91	1.90	1.88	1.87
$\frac{CaO}{SiO_2 + R_2O_3}$	2.03	2.02	2.02	2.05
$\frac{SiO_2}{Al_2O_3}$	2.55	2.35	2.46	2.50
$\frac{Al_2O_3}{Fe_2O_3}$	3.07	3.16	3.22	2.97

The output of the above high alumina clinker from the kilns, when compared with the output of the normal clinker as is Example No. 1, gave an average reduction in output of 11%.

The appearance of this clinker was very green in color and comparatively small and uniform in size, ranging from ¾ in. down.

The average specific gravity is 3.12.

The average clinker soundness is 48.0%.

The average clinker when ground to cement with the proper addition of gypsum gave the following average results:

The average cement soundness	84.0%
LeChatelier expansion	9.0 m.m.
Specific gravity	3.09
Tensile strength, pounds per square inch	*1:3 sand mortar*
3 days age	204
7 days age	277
28 days age	382
3 months age	394

The fuel oil consumed per barrel of clinker burned averaged 11.1 gal., which, when calculated to B.t.u.'s, equals 1,624,374.

The increase in fuel consumption per barrel of the high alumina clinker burned as

compared with the normal clinker averages 1.3 gal., or 190,242 B.t.u.'s per barrel.

This experiment under the heading of Example No. 2 consisted of a condensation of results intermittently obtained over a period of four months.

Example No. 3—To the normal raw mixture was now added iron ore in very small percentages, namely, from 0.8 of 1% at first to 1.5% at later periods. This iron ore was added with the idea of displacing part of the alumina content of the raw mixture with iron oxide.

A typical analysis of the iron ore is as follows:

	Iron ore
SiO_2	2.40%
Al_2O_3	26.24%
Fe_2O_3	69.76%
CaO	0.64%
MgO	0.00%
S	0.00%
Ign. loss	0.00%
Undetermined	0.96%

The small addition of iron ore to the normal raw mixture gave us a type of clinker which, in this case, may be considered as "high iron."

There is shown below the analyses of four samples of clinker which are representative of this "high iron" clinker as manufactured by us.

These to be referred to as Example No. 3.

CHEMICAL ANALYSIS CLINKER—EXAMPLE NO. 3

	No. 1	No. 2	No. 3	No. 4
SiO_2	20.90%	20.84%	20.94%	21.20%
——	1.93	1.97	1.97	2.03
Fe_2O_3	4.04%	4.01%	4.05%	3.82%
CaO	64.84%	64.60%	64.66%	64.72%
MgO	2.18%	2.15%	2.20%	2.16%
SO_3	0.51%	0.58%	0.51%	0.62%
Ign. loss	0.40%	0.50%	0.32%	0.40%
Alkalies, etc.	0.37%	0.62%	0.77%	0.50%
$\frac{SiO_2}{R_2O_3}$	1.93	1.92	1.97	2.03
$\frac{CaO}{SiO_2 + R_2O_3}$	2.05	2.04	2.05	2.04
$\frac{SiO_2}{Al_2O_3}$	3.09	3.11	3.18	3.22
$\frac{Al_2O_3}{Fe_2O_3}$	1.67	1.67	1.59	1.72

The output of the above high iron clinker from the kilns, when compared with the output of normal clinker as in Example No. 1, showed an increase approximating 15%.

The output of the high iron clinker from the kilns, when compared with the output of high alumina clinker as in Example No. 2, showed an increase approximating 26%.

The appearance of this clinker is very brownish-black in color and somewhat irregular in size, ranging from 1½ in. down.

The average specific gravity is..............3.20
The average clinker soundness is............86.0%

The average clinker when ground to cement with the proper addition of gypsum gave the following results:

The average cement soundness......100.0%
LeChatelier expansion .... 1.7 m.m.
Specific gravity 3.14

Tensile strength, pounds per square inch	*1:3 sand mortar*
3 days age	248
7 days age	328
28 days age	416
3 months age	464

For the initial addition of the iron ore to the raw materials in proportions of 0.8 of 1% to 1.0% the fuel oil consumed per barrel of clinker burned averaged 8.8 gal., which, when calculated in B.t.u.'s, equals 1,287,792.

For the increased additions of iron ore to the raw materials in proportions up to 1.5% the fuel oil consumed per barrel of clinker burned averaged 8.3 gal., which, when calculated to B.t.u.'s, equals 1,214,622.

This latter fuel consumption is now being received and further additions of iron ore to the raw mixture is yet to be made until the best all around results are obtained in the way of fuel economy and quality in the resulting cement.

Using this latter figure we find that the fuel oil required to burn a barrel of high iron clinker, when compared with the fuel oil required to burn a barrel of normal clinker, as in Example No. 1, is 1.5 gal. less, which, when calculated to B.t.u.'s, equals 219,510.

Using this latter figure we find that the fuel oil required to burn a barrel of high iron clinker, when compared to the fuel oil required to burn a barrel of high alumina clinker, as in Example No. 2, is 2.8 gal. less, which, when calculated to B.t.u.'s, equals 409,752.

This experiment under heading of Example No. 3 consists of a condensation of results received over a solid period of four months to date (December, 1927) and is still being carried out.

Remarks

With too high an iron oxide content in the cement there remains the possibility of ring trouble and balling up of the material in the kiln. Added to this is the probability of making a cement somewhat darker in color than the average cement; however, to date this trouble in our particular case has been nil.

Summed up, the advantages of increasing the iron oxide content in the raw materials, and thereby displacing a part of the alumina content, have not only been beneficial in promoting excellent fuel economy, but have also increased the quality of the cement to a very marked and appreciable degree.

This iron ore, though an expensive raw material, had only to establish a fuel oil savings of 0.28 parts of a gallon of fuel oil per barrel of clinker burned in order to pay for itself.

To date it is not only paying for itself in the saving of 0.28 parts of a gallon of fuel oil per barrel of clinker burned, but is effecting a further savings approximating 1.22 gal. per barrel.

In cement plants where cheap fuel is obtainable in the form of coal, gas or oil, this savings in kiln fuel is no great item, yet the better quality cement obtained by displacement of a part of the alumina content with iron oxide, is well worthy of receiving due consideration. However, in cement plants situated at a distance from their fuel supply, and where the fuel item alone approximates one-fifth to one-third the total cost of manufacture, this fuel savings is alone an item of importance and necessity.

Where continued trouble is experienced in cement plants with the unsoundness and low strength factors in their cement, this ability to better the all-around qualities of the cement through the displacement of part of the alumina constituent with iron oxide is a matter well worth investigating.

To the manufacturer whose quarry limits the usage of only certain materials, which may give an unbalanced and therefore very hard burning mixture in the kilns, the fuel consumption figures as shown in the high iron clinker, or Example No. 3 tests, may seem low and out of the question, but to the manufacturers who find it necessary to economize on fuel, these figures may appear about right.

These data are given to show that in our particular case we have not found the high alumina content in the raw materials of any marked benefit as a fluxing agent in the kilns, while the opposite has been true of a semi-high iron oxide content.

New Book on Highway Materials

A NEW book, entitled "Highway Materials," by Edward E. Bauer, has recently been published by the McGraw-Hill Book Co. The book comprises a complete and concise treatise on all forms of material used in modern highways and includes a thorough discussion of the production, specifications, testing and sampling of all types of materials. Much of the data was obtained through work done in the engineering department of the University of Illinois, at Urbana, where Mr. Bauer is instructor of civil engineering.

This work has been written in such form that it makes a desirable textbook, yet nothing has been included that might detract from the interest of the general reader. Portland cement, sand and gravel, crushed stone, bituminous materials and a number of miscellaneous materials are discussed in detail in sections devoted to each. The treatment includes a clear statement of the best known methods of practical production, together with a full discussion of the usual tests, and a concise statement of the specifications of each substance, thus making the work well worth while as a ready reference book. The book is well illustrated.

Convention of German Association of Portland Cement Manufacturers

Members Present Papers on Research and Development—With Author's Comment

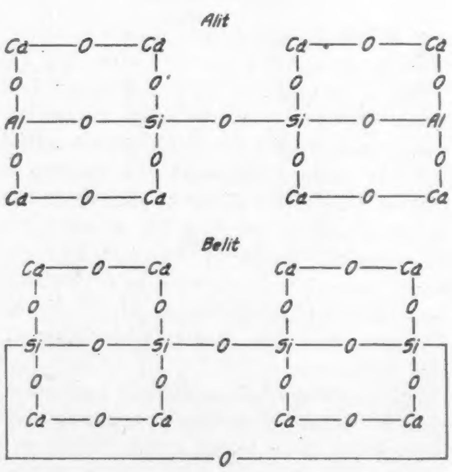
By Dr. C. R. Platzmann
Consulting Engineer, Berlin, Germany

THE Association of German Portland Cement Manufacturers held its 51st annual convention on March 14 and 15 in Berlin. As is customary with the association, a number of scientific and technical papers were presented on research and development work pertaining to the industry, along with the usual transaction of association business. The following abstracts were made from the papers delivered at the meeting:

Research on Alite

(Dr. E. Janecke)

According to Dr. Janecke, cement consists of calcium alite, $8CaO{\cdot}Al_2O_3{\cdot}2SiO_2$, which has its parallel in strontium and barium alite, CaO, $3CaO{\cdot}Al_2O_3$, glass, and beta $2CaO{\cdot}SiO_2$. He denies the existence of tricalcium silicate. X-ray studies revealed the remarkable fact that alite and belite $2CaO{\cdot}SiO_2$ yield identical interference spectra, a phenomenon which finds its explanation in similar constitution:



The substitution of aluminium for silicon is an observation frequently encountered in natural rocks, such as augite, hornblende and triclinic feldspar. The part played by iron in cement was discussed next. It was pointed out that "iron alite" does not exist. Concerning hydration, the following hydrates are produced: $Ca(OH)_2$, $2CaO{\cdot}SiO_2{\cdot}H_2O$ and $2CaO{\cdot}Al_2O_3{\cdot}6H_2O$. Setting is based on the action of water on alite, while hardening is a further reaction between water and belite. With alite are also associated $2CaO{\cdot}Fe_2O_3{\cdot}6H_2O$. For further confirmation of his conclusions, Dr. Janecke quoted recent tests of ternary systems: $BaO{\cdot}Al_2O_3{\cdot}H_2O$ and $CaO{\cdot}Al_2O_3{\cdot}H_2O$.

The Chemistry of High Early Strength Cements

(Dr. Hans Kuhl)

The highest values of strength were obtained with cements high and low in silica, while a medium silica content seemed to be incompatible with high strength values. As cements with low silica content sinter easily and show a tendency to ring formation, they should not be too finely ground. The raw mix may be controlled by admixture, such as fluorspar and calcium chloride. Hardening activity may still be increased subsequent to calcination, though rapid calcination and cooling contribute greatly to raising the strength of cements. $CaCl_2$ used in certain concentration strongly reduces the time of set. The most marked increase in strength was achieved with $CaCl_2$ and $Ca(NO_3)_2$; the tensile strength at 2 days was 20%, the compressive strength 50% higher than standard, while the final strengths showed no appreciable change.

There is a tendency at present for combining the manufacture of cement with other industrial processes. Thus the chemical industry has produced cement from gypsum with simultaneous manufacture of sulfuric acid. The residues in the manufacture of calcium nitrates, which require the formation of acetylene from calcium carbide, have not been utilized. Attempts are being made to convert phosphates into alumina cements by means of coal and bauxite.

Cement Investigations

(Dr. R. Nacken)

The fact that scientific cement problems could only be considered solved when pure synthetic materials are used was emphasized by Dr. Nacken. He described a method whereby calcium silicates and aluminates may be obtained in crystalline form by allowing them to crystallize at high temperatures from appropriate salts. An agreement as to the compounds of SiO_2 with oxides of bivalent metals does not necessarily indicate similar physical-chemical properties. Ca-metasilicate and Sr-metasilicate form mixed crystals, yet this does not apply to Ba-metasilicate. Microscopic and X-ray studies must equally be first carried out on the simple, pure components before an attempt can be made to study the complex systems of cement.

In conclusion, Dr. Nacken spoke of the unsoundness of cements, which, in his opinion, is of capillary nature. According to him, careful manufacture and rational use are the best formulas to prevent local accumulations of such components as are capable of reacting with water, sulfuric acid, etc.

Mortar and Concrete

(Dr. E. Probst)

The various uses of cement were discussed by Dr. Probst and particular stress was placed upon the effect of the water-cement ratio. As a confirmation of preceding work, he pointed to the economic importance of the coarse aggregate with a corresponding proportion of sand. Examples were shown of the detrimental effect on strength caused by excess of fines in sand, and of the increase in absorption of concrete when a high proportion of sand is used with an increasing water-cement ratio. The latter is of particular moment on road construction.

Concerning the different formulas for the determination of expected strength of concrete at a certain age, Dr. Probst comes to the conclusion that it is impossible to summarize the effect of all the controlling factors in one formula and that, for this reason, such formulas have but a limited application. It is his opinion that they may be useful in the laboratory, but are inadequate for use in the field.

In speaking of the chemical resistance of concrete, Dr. Probst established that densest concrete had greatest resistance. The concentration of the active chemicals and the period of exposure are determining factors.

Porous Cement

(Dr. J. Meyer)

Dr. Meyer, Breslau, reported on his process of making a new porous concrete building material by adding an admixture of a gas producing substance to the concrete,

which causes expansion and results in a light weight concrete, eliminating the disadvantages of ordinary concrete in residence building. His criticisms of the use of powdered aluminium as a gas-producing medium cannot be considered well-grounded, as good results have been obtained in its use in Scandinavian countries for several years.

Steam Curing for Test Samples

(Dr. Karl Biehl)

The method consists of steam curing standard specimens to satisfy the demand for a rapid and reliable test for portland cement. The best conditions of high pressure steam curing appear to lie around 16 hours exposure at 16 atmospheres. To obtain results in an even shorter time, the period was reduced to 4 hours and the pressure was raised to 24 atmospheres. Standard 28-day curing was best reproduced by 8 hours' hardening at 16 atmospheres pressure. The following results were obtained:

Ref. No.	Values of strength in kg. per cq. cm. — Standard combined curing (1 day air, 6 days water, 21 days air) — Tension	Compression	Steam curing — Tension	Compression	Cement
1	40.0	425	......	456	Portland
2	44.3	437	......	497	Portland
3	43.4	442	......	448	Slag cement
4	39.8	508	......	502	Iron portland
5	46.6	516	......	525	Portland
6	36.6	530	......	463	Portland
7	41.7	535	......	521	Portland
8	46.8	540	......	506	Portland
9	42.7	544	......	581	Portland
10	40.0	549	......	519	Portland
11	52.6	654	......	610	High early strength portland
12	44.8	656	45.6	692	High early strength portland

Shrinkage Due to Setting

(Dr. E. Schott)

In his report on investigations of "Cracks Caused in Glass Plates by Standard Tests Pats," Dr. Schott referred to an assumption of Nitzsche and Müller that these were caused by shrinkage. The tests showed that no regularity could be observed in the adherence to the plates of water cured specimens of the same lot of cement and that air-cured pats were almost always found to draw away from the plates.

Cements which are unsound due to free lime always cause the plates to crack. All cements which produced cracks when cured in water showed normal expansion when tested by means of the Bauschinger apparatus. The adherence of cement pats to the glass plate is greater, the longer the plate has been in use, as the surface of the plate becomes corroded through continued use. This is apparently caused by the formation of caustic lime. No relationship could be established between fineness and adherence. The effect of gypsum was tested by making pats of one brand of cement mixed with different percentages of gypsum. The tendency for the pats to break away occurred only when the calcium sulfate content present was great enough to render the specimens unsound.

An investigation of different varieties of glass showed that the coefficient of expansion was not the determining factor, but that the quality of the glass was of great influence. Glass plates which were partly dull and partly smooth showed cracks only over the dull surfaces. The cracks developing in glass plates under water give no indication of the soundness of cement. Expansion and contraction of cement are so small that they are of a very minor importance compared to the effect of grading of aggregate and of the quantity of mixing water.

Other Reports

Other papers presented at the meeting were: Dr. Fuld Mainz, "Cement Nomenclature from the Legal Standpoint;" C. Mittag, "The Process of Operation in Tube Mills;" Dr. Pollert, "Evolution of the Automatic Kiln;" J. Möller, "The Fuller-Kinyon Transportation System for Cement and Other Materials;" and Dr. Brückmann, "Review of the Present Status of Transportation in the Cement Industry."

Fuld's paper has but a restricted interest for the readers of ROCK PRODUCTS, as it refers to the special conditions in Germany. Similarly, the paper on the Fuller-Kinyon system is not discussed, as it has its origin in America and is well known there. The description of the operation of tube mills furnished many edifying points of the evolution of the tube mills, whose history goes back to 1886, and presented a very extensive review of this important unit in the cement industry. Dr. Pollert pointed out that automatic shaft kilns are capable of reaching a daily output up to 85 tons, substantiating this statement by citing the performance of two kilns of the Norddeutsche portland cement plant Misburg. The extensive use of the automatic shaft kiln is due to its low initial cost and to its excellent heat economy.

German Cement Industry Breaks Production Record

THE total output of cement in Germany during the first quarter of the present year amounted to 1,498,000 tons. This constitutes a new record. Exports average over 100,000 tons monthly, the Latin-American republics being the principal buyers. Production is rising steadily. The greatest proportion of the exports is ferro-portland cement, while the cheaper portland cement and blast furnace cement both show considerable decreases.

Sweden Exports Cement in Paper Bags

Consul John Ball Osborne, Stockholm, Sweden

AN INTERESTING DEVELOPMENT reported in the foreign cement trade of Sweden is the increased use of paper-bag packing. A firm of exporters in Stockholm states that it now ships from 30,000 to 40,000 such bags of cement per month to the South American market. The firm itself is surprised that this form of packing can prove adequate to the strain imposed on it by the long transportation, but states that it has been favorably accepted and is now being required by some South American importers. It is unlikely that with the newer forms of paper bags being used there should be much danger of breakage even in such a long trip as this.

The bags, which are made of several layers of strong wrapping paper, hold approximately 57 kilos each, three bags equaling one barrel. The small size and weight of the bags, of course, greatly facilitate loading and unloading in addition to reducing freight charges considerably. This form of packing has been used almost exclusively for many years in the domestic cement trade.—*U. S. Commerce Reports.*

Cement Plant Planned for Swansea, Wales

DURING the fall of 1927 two essential ingredients for the manufacture of cement were discovered on land situated in Killay, a suburb of Swansea, Wales, according to the report of Consul John J. C. Watson at that city. Representatives of several firms engaged in the cement industry became interested and provided money with which to make tests of these ingredients. The experiments were so favorable that it is now practically certain that a cement plant will be built shortly. It is reported that options have been obtained on the property and a company will be formed to take over this property and erect a plant.

Details concerning the new company and the plant to be erected have not been made public, but it has been learned on good authority that the enterprise is to have a share capital of £500,000 (equal to about $2,400,000). It is planned to erect a thoroughly modern unit of one kiln with capacity designed to supply the needs of West Wales, and with provision for subsequent expansion as demand warrants. The company might later enter the markets of the United Kingdom and Ireland.

Bids have been obtained from contractors and it is probable that construction will commence in the spring and be completed by June 1. Excellent transportation facilities will be available through the London, Midland and Scottish railway, which serves this section, and the Swansea docks, five miles distant.

The East Toledo Slag Plant of the France Slag Company

All-Steel and Concrete Plant Replaces One Destroyed by Fire in 1927—Many Novel Features Incorporated in New Design

By Henry W. Schaub and D. W. Yambert
Mechanical Engineer Electrical and Mechanical Engineer
France Slag Co., Toledo, Ohio

THE East Toledo, Ohio, plant of the France Slag Co., which was a frame structure, was destroyed by fire late last fall. Work was begun immediately on plans for a new plant which has been just recently completed and put into operation. Steel and concrete construction are used for permanance and to insure against the recurrence of the plant's destruction by fire. The plant layout is especially interesting in that it embodies many modern and unusual features.

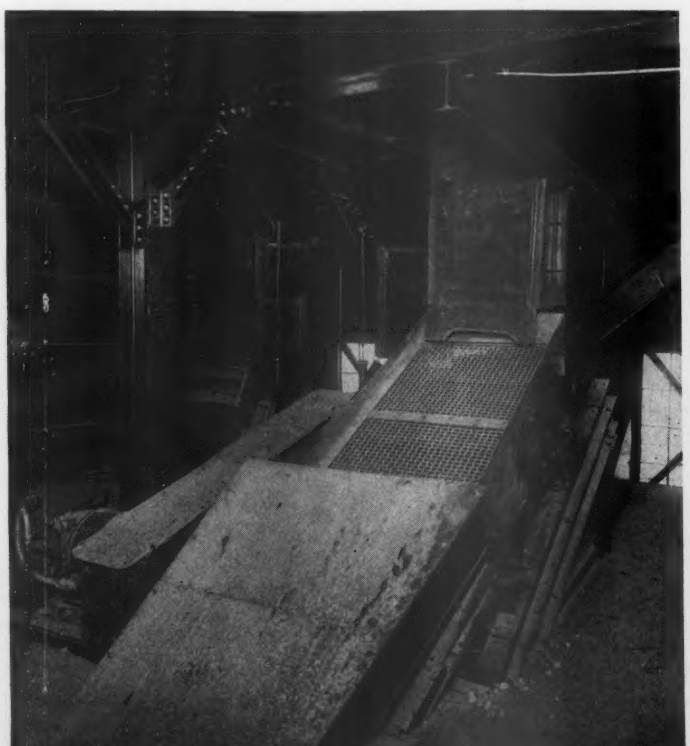
Among these are: The hoisting of standard railroad hopper cars; scalping of raw material ahead of crusher by means of disc grizzly; the use of a 72-in. x 30-ft. all-steel revolving screen; the use of a 60-in. x 24-ft. revolving screen specially designed and built by the France company; a special loading and rescreening installation for removal of undersize and spalls prior to loading, and for obtaining a more accurate mixture of sizes; concrete bins spanning two tracks; speed reducer drives on all machines except the crusher; exceptional safe-guarding of equipment to eliminate accident hazards; individual motor drives throughout; all motors totally enclosed, dust-proof and ball-bearing equipped; motor-starting panels of the enclosed magnetic contactor type and connected for sequence operation.

Handling the Raw Slag

The molten slag is brought from the furnace in ladle cars and dumped into one of two parallel slag pits where it cools and solidifies. While molten slag is being poured into one pit the model 95 Bucyrus steam shovel digs the cooled slag from the opposite pit and loads it into 50-ton capacity standard-gage railroad hopper cars. The cars are transported to the foot of the incline by means of a 30-ton saddle tank Vulcan steam locomotive.

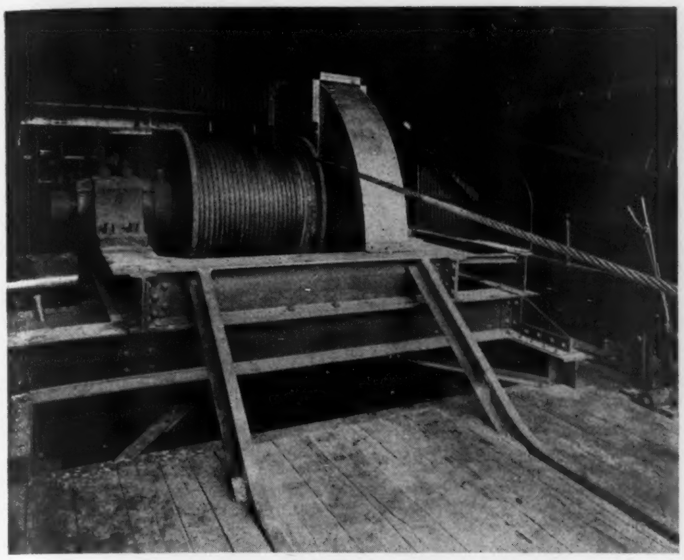
A motor-driven hoist then hauls the cars, one at a time, up an incline of about 12% grade on to a pair of track girders spanning 54 ft. Two hoppers, having a combined capacity of about 65 tons, are suspended from these girders, into which hoppers the cars of rough slag are dumped.

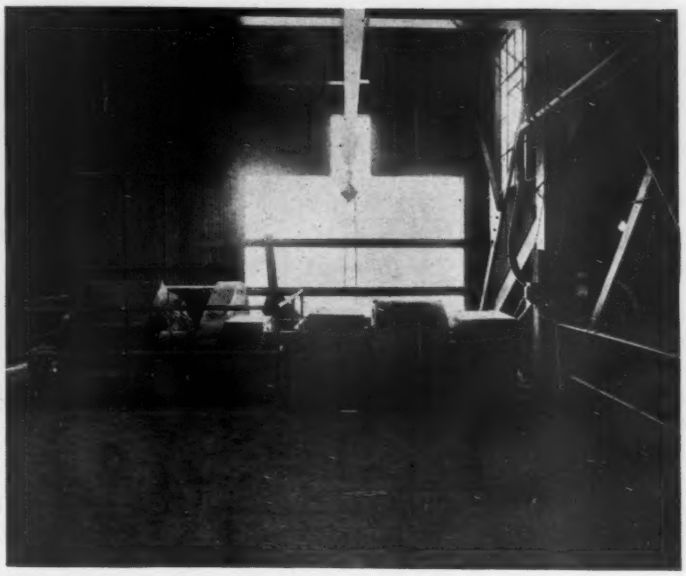
Reciprocating plate feeders are employed

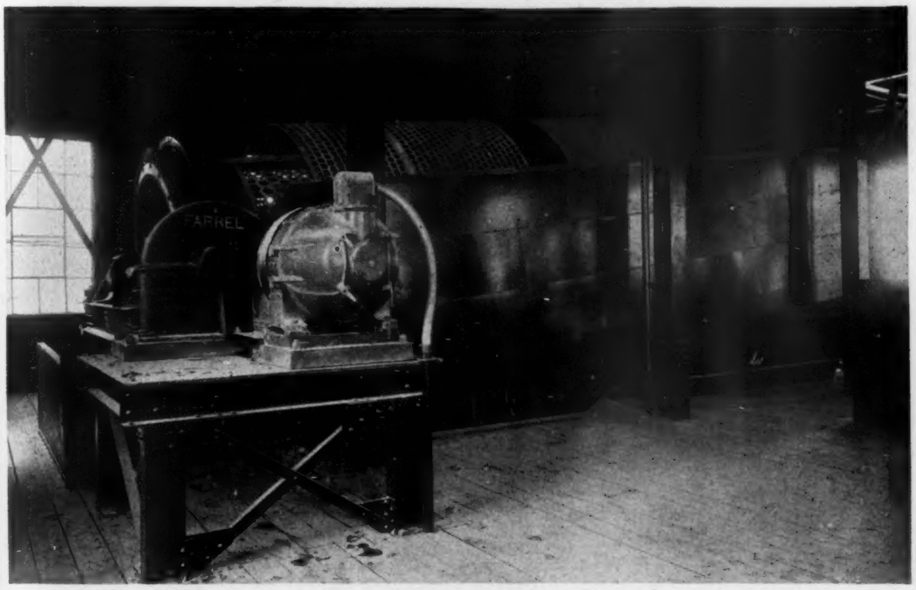


Double-deck mechanical vibrating screen with 1-in. openings above and 1/2-in. openings below

Double-deck electrical vibrating screen used on the fine sizes; 1/2-in. above and 1/4-in. below


Hoist which pulls the cars of slag to the apron feeder and disk grizzly


Head of pan conveyor that raises the crusher product to the scalping screen



The 72-in. by 30-ft. screen which takes the crusher discharge, rejecting all above 4-in.

to feed the slag from the hoppers to an apron conveyor, which serves as a picking table for removing occasional large pieces of iron contained in the slag, which might seriously damage the crusher. A gib-crane has been provided for lifting these large pieces of iron, which often weigh as much as two tons, from the apron conveyor.

Very Large Disk Grizzly

The slag is discharged from the apron conveyor to a 5-shaft, 42-in. wide Robins disk grizzly having 16-in. diameter disks. The discs are spaced for 4-in. openings and can be changed by addition of spacer washers to 4¼-in. and 4½-in.

Due to the fact that there is a demand in this territory for a large quantity of slag ranging in size from 2-in. to 4-in., this disc grizzly was installed to remove the sizes below 4-in., thus preventing the possibility of their being further crushed, had they been permitted to enter the crusher.

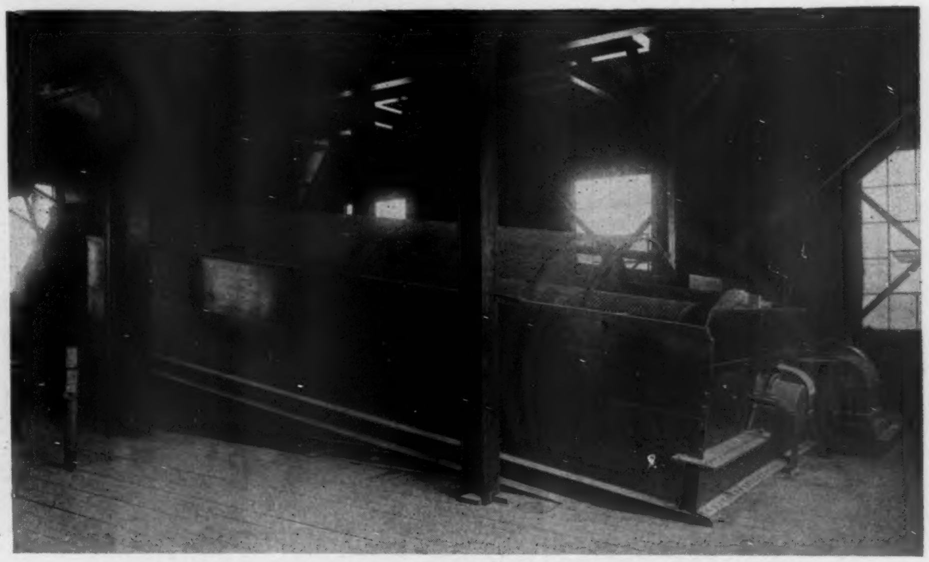
Material rejected by this grizzly enters a No. 8 gyratory crusher.

Both the material passing through the disc grizzly and that discharged by the gyratory crusher enters a 16-in. x 129-ft. center pan conveyor, which elevates it to the top of the screen house.

This pan conveyor discharges the material to a magnetic separator belt, which conveys the slag to a 72-in. x 30-ft. revolving screen, and also removes small pieces of iron, which go directly to a bin. This screen rejects all material over 4-in. and separates the remainder into the several sizes.

Commercial Sizes

The rejected material is returned to the crusher, the 2½-in.-4-in. size goes to a disc grizzly which removes spalls and carry over below 2-in.; the 2-in.-2½-in. size goes directly to its bin; the 0-2-in. size goes to a


The 60-in. by 24-ft. screen which makes the final sized products

60-in. x 24-ft. revolving screen, where it is further separated into the following sizes: 0-in.-¼-in., ¼-in.-¾-in., ¾-in. to 1 in. and 1-in. to 2-in.

The 0-¼-in. size goes directly to its bin; the ¼-in.-¾-in. size goes to a Traylor vibrator, where it is further separated into ¼-in.-½-in. and ½-in-¾-in., both of which go directly to their bins; the ¾-in.-1-in. size goes to a Traylor vibrator which removes spalls and carry over; 1-in.-2-in. size goes to a Niagara vibrator, which removes spalls and carry over.

Each of the several sizes produced goes to a bin of its own, no mixing of sizes being done in the bins.

There are nine bin compartments including the iron bin, the bottoms of each of which are equipped with three gates each.

Beneath the bins, which span two loading tracks, are suspended two parallel loading conveyors. These conveyors convey and elevate the material from the bins to a loading and rescreening station.

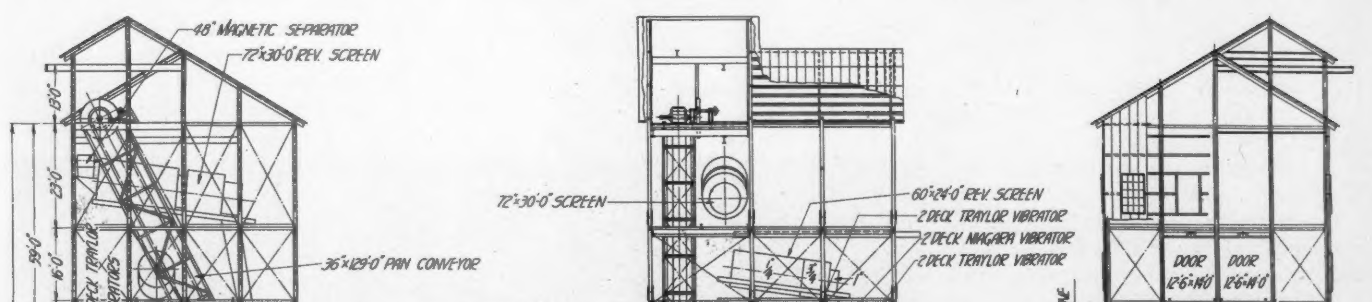
Mixing Conveyors

One gate from each of four of the bins feeds on to one of these conveyors, and one gate from each of the other four bins feeds on to the other conveyor. The one conveyor handles sizes ranging for ¼-in. to 2-in., while the other conveyor carries sizes 2-in. to 4-in.

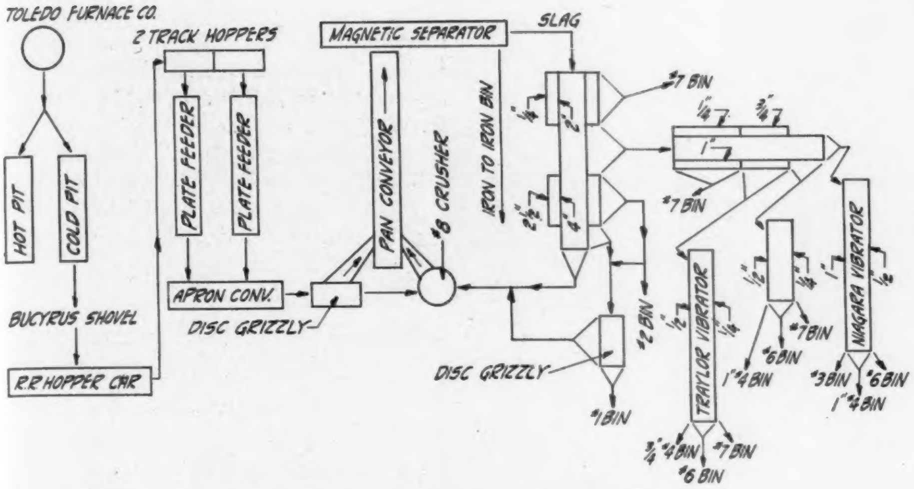
With this loading arrangement it is possible to proportion the quantity of each of two or more sizes, thus obtaining any desired mixture.

The conveyor handling the smaller sizes discharges to a Traylor vibrator, where a final removal of spalls and undersize is made. The conveyor handling the larger sizes discharges on to a Robins disc grizzly, which

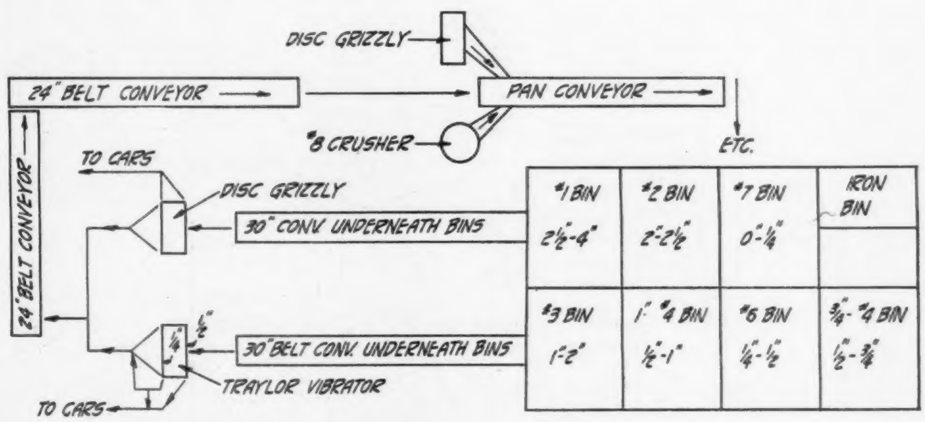
The new plant of the France Slag Co. which replaced one burned in 1927



Sectional elevations through the entire plant



Flow sheet of slag recovery and crushing plant



Flow sheet of material passing through bins and rescreening plant

likewise removes spalls and undersize. Underneath each of these screens, a special loading chute has been provided, which can be lowered into the cars, thus preventing further breakage during loading. The spalls and undersize taken out by these screens are returned to the main bucket elevator by means of belt conveyors.

Safety First Everywhere

The France company has a deep interest in safety-first work and has therefore fitted this plant with extensive safeguards.

Some of the safety precautions taken are: Standard pipe railing around all openings and along stairways; heavy toe boards of standard height around all openings; guards around all gears, couplings and moving parts; electric wiring in steel conduit; motor starters encased in steel cabinets; motor starter disconnect switches provided with auxiliary contact, making it impossible to open the switches until the load has been removed by the magnetic panel; enclosed commutators and brushes on motors; safety motor release and lock-out switches at each machine throughout the plant; electric siren signals to warn workmen prior to starting plant.

Direct current power at 230-v. is used and is purchased from the Furnace company, in whose yards the slag plant is built. The motors and control were supplied by General Electric Co. The motors are totally enclosed, fan-cooled, ball-bearing and compound wound except the hoist motor, which is a series wound, totally enclosed, mill type sleeve bearing motor.

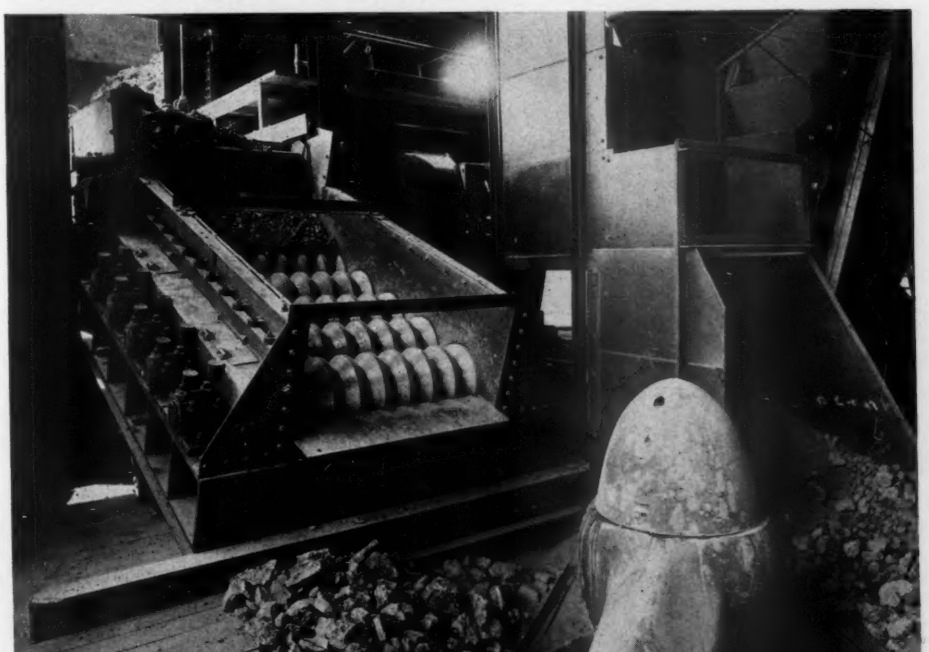
The starting panels are of magnetic contactor type, with undervoltage and temperature overload protection and are enclosed in steel cases. The control circuits to the panels are connected for sequence operation so that by simply pressing one start button the various plant motors will start one after another in the order opposite to that of the flow of material through the plant. If a motor stops from any cause, all motors driving machines feeding material to the shutdown machine will automatically shut down, thus preventing the piling up of slag on the shut-down machine.

The crusher control provides for automatically plug stopping the motor in case a piece of iron gets into the crusher, thus practically eliminating the possibility of breaking or bending the crusher shaft.

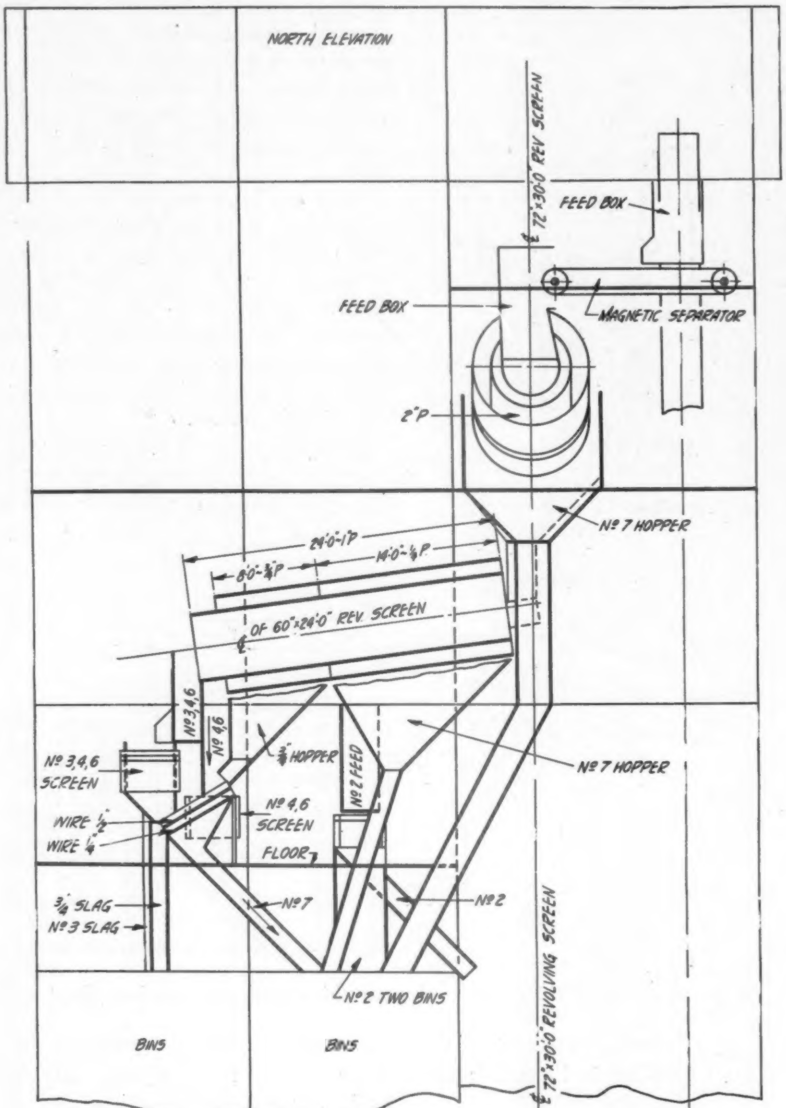
The bucket elevator motor is equipped with a series wound magnetic break, which releases under load and sets when the motor stops, thus preventing the overhauling of the bucket elevator should it be loaded with slag.

The hoist control is quite elaborate. The railroad hopper cars are hoisted up the incline at a speed of 100 ft. per minute, and are lowered by means of dynamic breaking. The motor is equipped with a shunt-wound magnetic brake which sets whenever the power is removed from the motor.

The hoist is normally started and stopped by push button, and a geared limit switch is provided to prevent overtravel.



Apron feeder, disk grizzly and gyratory crusher



Plan and elevation of screening plant

The entire plant was designed and construction supervised by the France Slag Co.'s engineers, the concrete and steel design and mechanical construction being handled by H. W. Schaub and the electrical motor and control installation by D. W. Yambert.

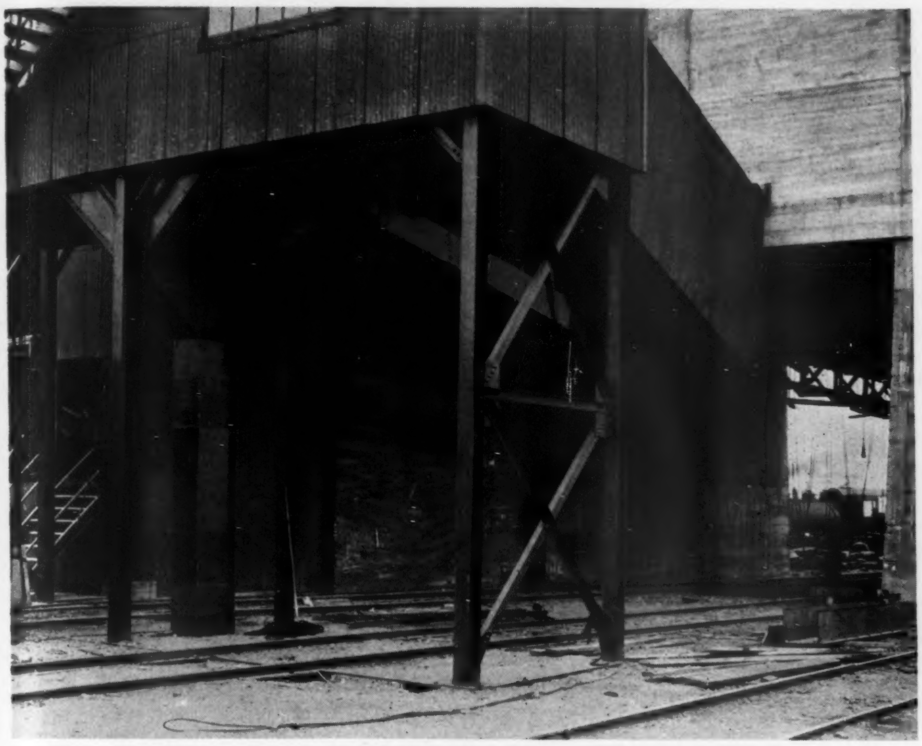
B. W. Cochran is plant superintendent. Harry Abbott was construction foreman during the plant erection, and Elmer Howell was chief electrician.

Author Defends "Practice vs. Possibilities in Cement Manufacture"

EDITOR: I note with interest the letter which Carl Naske, of Germany, has in your issue of April 28, p. 79. I am not surprised that there should be some criticism from some sources in regard to my article, "Practice vs. Possibilities in the Cement Manufacturing Industry," but I will admit that I was somewhat taken back to read this gentleman's cancellation of some of the suggestions in such an arbitrary fashion. In other words, a simple wave of the wand and our castles have vanished into thin air.

But after a second scrutiny of some of the objections raised I have come to the conclusion that Mr. Naske has missed the point in the main and is straining at a gnat. Mr. Naske feels that waste heat of stack gases should not be used in the elimination of carbon dioxide from limestone simply because he feels that we do not have quite enough heat to complete the reaction. I am afraid that he has overlooked the fact that the calories necessary to bring the material up to the heat necessary for evaporation of carbon dioxide are quite as necessary and important as the heat required to tip the reaction in the right direction, once the point has been reached. Would he, simply because he had in his pocket a sum lacking but a few cents of the amount required to buy a given thing, throw his money away in disgust, or would he look to ways and means to provide that little necessary to attain his object? No, indeed, I am afraid that this idea cannot be cancelled in such an easy or informal fashion. It would require very little extra heat, if any, to drive the carbon dioxide from limestone in addition to that supplied by the stack gases of the average kiln. Any clever pencil may figure defeat for common reactions, or in case a pencil is not forthcoming any hand-book will give the figures required to evaporate CO_2. This is general information and well known to every engineer.

As to the assertion that it would be too expensive to mix clay with hydrated lime as compared with the present system of grinding the limestone we can only reply that such a statement requires no answer. There is no basis in fact for this, because any experienced cement maker knows the contrary to be the truth. Most clay needs but very little grinding to make it fine



Loading tracks under bins at the France Slag plant

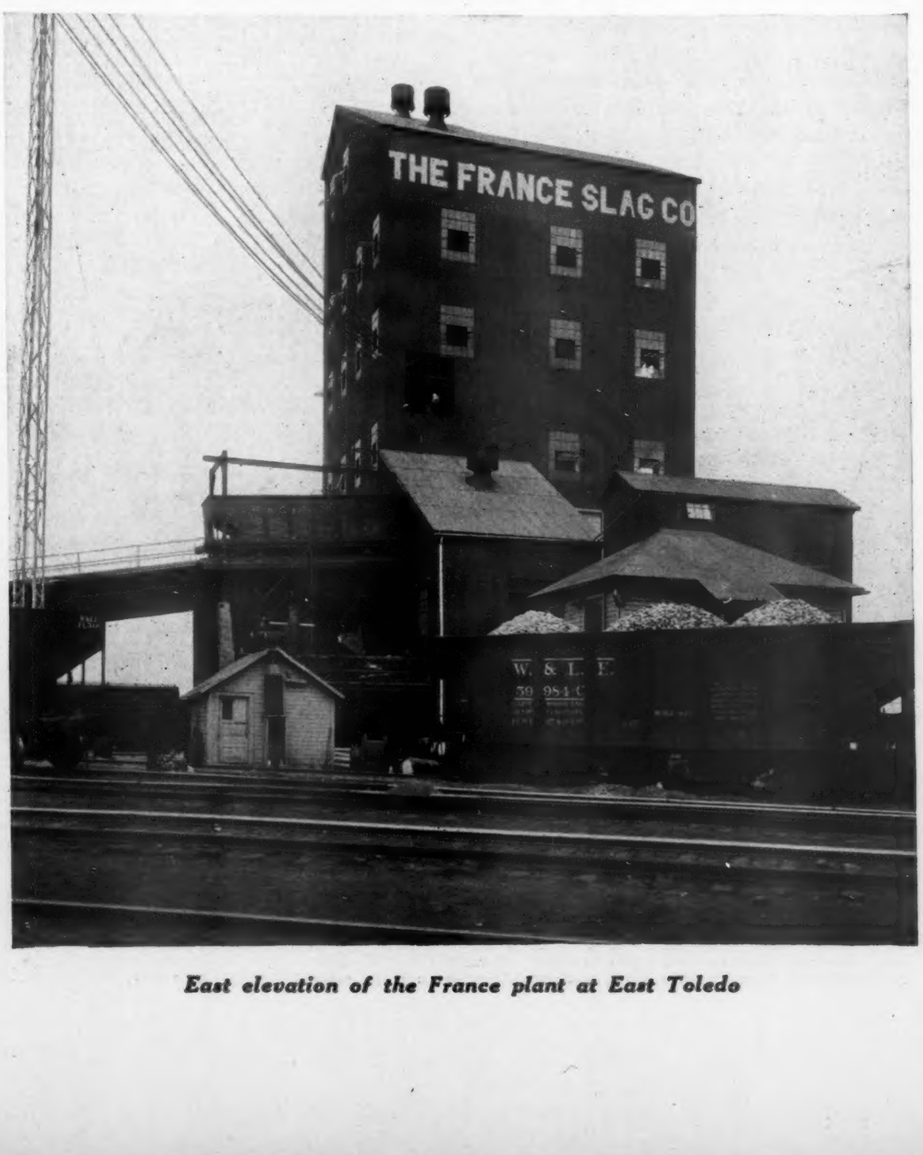
enough to combine in a cement-producing mixture. In the case of shale and slates this is not always true, but since the argillaceous material cannot exceed 23% of the total material to be reduced in any case, we still have the choice of saving power now required to grind the lime-rock. The fact that this has been tried in Japan many years ago does not enter into the equation. There the trial was the result of accidental arrangement and I have no record that states that a plant was deliberately designed to pre-burn the limestone, hydrate it and mix it. Simply because an idea is old, and there seems to be very few new ideas, means nothing for or against it. Sunlight is older than this suggestion by some few eons but we still await the time when some ingenious person will devise a method that will put its power to our service to the end that we are provided with all necessities and luxuries through its rays.

Relative to Mr. Naske's objection to using a 100% air in burning a rotary cement kiln, the only obvious reply is that he seems to disagree mainly because he has not seen it work. That such kilns do exist and are operating under such a condition is beyond his ken. Mr. Naske's trouble seems to be in that he still thinks in terms of primary and secondary air. Under the "100%" system there is no such thing as secondary air. At least there is only one kind of air and this is put in with the fuel, not around the kiln hood or elsewhere. The firing zone under actual conditions does not retreat towards the stack, as he suggests, but on the contrary advances toward the lower end of the kiln. Such an intimate mixture of air and fuel has a tendency to ignite very easily, and in truth an explosive mixture is created that requires very little persuasion to burn, in cement parlance, "on the nose ring." The actual point of burning is controlled by damper regulation and depth of load. The firing is done against an air cushion that creates an almost positive air condition around the hood. The balance here is maintained so perfectly that infiltration around hood is negligible and no mechanical air lock beyond sensible precautions need be taken. This is due to the pressure conditions around the hood and no reference to any hand-book is necessary to know that air does not flow readily into a vessel that already has a higher pressure.

These are data tried and proven on the burning of a million barrels of cement and Mr. Naske will find that he may achieve the same results if he will adapt his kiln to the new conditions in every respect. The velocity in the burner, the stack draft, the burning zone temperatures and many other items influence the results, but to no greater degree than the use of 35% air influenced the results of the first men who burned their clinker in rotary kilns. It must be admitted that efficient combustion demands that sufficient oxygen be supplied to complete the reaction sooner or later in any kiln. If part of this air be supplied here, another part there, only a tendency to have poor mixing conditions can result. Why wait with the procedure, when the air can be supplied with the fuel?

H. H. Blaise.

Everett, Wash.,
May 4, 1928.



East elevation of the France plant at East Toledo

The Manufacture of High Early Strength Portland Cement

With Particular Reference to "Novo" Cement Developed in Germany

By George P. Dieckmann
Chemical Engineer, American Miag Corp., Buffalo, N. Y.

THE DEMAND for high early strength cement is rapidly increasing and is receiving considerable attention from manufacturers. The manufacture of portland cement has undergone a great many changes and has progressed particularly in recent years. Not much consideration was given to improving the quality of portland cement above the standard specifications, as long as the production was well within the demand of consumption. Portland cement of high early strength is now demanded, which will in two or three days equal the results obtained by normal cement in 28 days. High early strength portland cement should not be confused with normal cement, simply ground finer or cement high in lime.

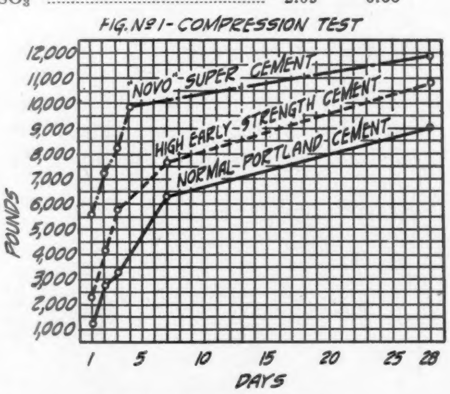
Some manufacturers are trying to grind normal portland cement very fine, to produce a quick-hardening cement; others raise the percentage of lime and obtain unsound cement, which may have a high compression test but is of low tensile strength. The lime is only one of the different constituents in cement and without also taking the other components into consideration the resulting cement will not have a high early strength.

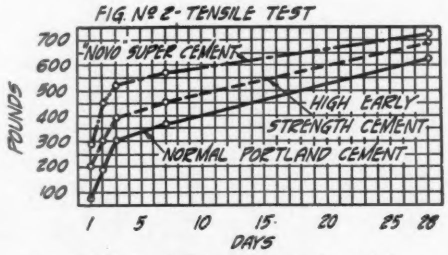
It is now a well recognized fact that a number of factors are interwoven and inseparably influence each other and enter the production of early strength cement, namely:

1. The raw materials must have the right composition, that is the silicate and hydraulic ratios must be properly adjusted to each other, likewise alumina to iron.
2. The raw materials must be so finely ground that all components can react with each other without leaving any particles of the material unaffected.
3. That a perfectly uniform clinker, thoroughly burnt, is produced with good fuel.
4. That the resulting cement is ground to the desired fineness.

One of the most modern portland cement plants in Germany offers a striking example and produces three different kinds of cement from the same materials. They use the wet process. The raw materials are limestone and a so-called calcarious clay of the following average composition:

	Clay %	Limestone %
Loss on ignition	12.26	39.78
SiO_2	57.20	4.22
Al_2O_3	8.12	4.25
Fe_2O_3	5.80	
CaO	22.84	50.51
MgO	2.07	0.58
SO_3	2.05	0.66





Strength at different ages for three types of cement

The clay contains a considerable amount of sand and is therefore first ground and then added as a thin slurry to the limestone before being fed into the compartment mill. The three kinds of cement produced are:

1. Normal portland cement.
2. High early strength cement.
3. A special portland cement of extra high early strength, known as "Novo" super cement.

Chemical analysis of these cements gave the following results:

	Normal portland cement per cent	Portland cement of high early strength per cent	"Novo" super cement per cent
SiO_2	22.08	21.22	20.26
Al_2O_3	5.32	5.84	4.93
Fe_2O_3	2.88	2.56	2.75
CaO	64.48	65.48	66.26
MgO	1.64	1.54	1.76
SO_3	1.18	1.30	1.52
Loss on ignition	2.00	2.02	2.52
Undetermined	0.66	0.04	0.11
Hydraulic ratio	2.09	2.18	2.32
Silicate ratio	2.69	2.53	2.64

It is well known that a finer ground cement requires more water due to the superfine flour and larger surface which is produced, causing a colloid or silica gel which forms more quickly and in larger quantities. If enough water is not added, the formation of gel is decreased and the cement may become quick-setting.

Due to the chemical composition of "Novo" super cement containing the highest proportion of lime possible, the tensile strength is not increased in the same proportion as the compressive strength because the maximum lime content is more favorable for compression. These characteristics are, of course, of the highest importance for concrete construction and would make it possible to remove the form work after 24 hours. However, other factors entering into construction work prevent this at such an early stage, but after 48 hours it is possible to remove the forms without any danger. The high compression of properly made concrete guarantees absolute safety. "Novo" super cement can be considered as a result of scientific research combining mechanical and chemical knowledge in cement manufacture.

FINENESS

	No. 900-mesh	4900-mesh	10,000-mesh	Specific gravity—not heated
Normal portland cement	0.3%	15 %	26 %	3.05
High early strength cement	0.1%	10.5%	20.4%	3.04
"Novo" super cement	....	3.3%	10.0%	3.05

SETTING TIME

	Water used	Initial	Complete	Constancy of volume—boiling test
Normal portland cement	27%	2½ hrs.	8½ hrs.	perfect
High early strength cement	27%	2½ hrs.	8½ hrs.	perfect
"Novo" super cement	27%	2 hrs.	6 hrs.	perfect

No. 900-mesh German sieve equal to about 75-mesh U. S. A. sieve.
No. 4900-mesh German sieve equal to about 175-mesh U. S. A. sieve.

TENSILE STRENGTH IN LB./IN.²

All tests made in accordance with German specifications.

	Water used	1-day	2-day	3-day	7-day	28-day	28-day combined
Normal cement	8 %	41	189	305	370	457	659
High early strength cement	8½%	201	300	389	451	520	690
"Novo" super cement	8¾%	291	454	540	564	564	718
COMPRESSION TEST							
Normal portland cement		1025	2705	3289	6262	7653	9002
High early strength cement		2130	4167	5836	7668	9556	10763
"Novo" super cement		5632	7213	8420	9954	11374	11814

All test specimens kept in air for one day and in water for the remainder of the time, except for the combined 28-day test which was kept in air and water alternately.

The Manufacture of Gypsum Plasters

Leaves from an Operating Man's Note Book—Part IV.—Mixing Plasters

By W. B. Lenhart
Consulting Engineer and Chemist, Long Beach, Calif.

THE MECHANICAL MIXING of gypsum plaster mortar has been adopted as standard practice in very recent years, and for that reason a word might be said regarding the effect of time on the mixing of mortar mechanically. This applies to stucco both retarded and unretarded, as the latter material finds use in the manufacture of wallboard, tile, etc.; also to the effect with sand present in the usual proportions.

In the following tests a mechanical mixer was designed that permitted inspection at all times and was of absolute cleanliness. A 2-lb. charge was used in each case. Samples were taken from the mixer at intervals of one minute or longer, and the setting time on this pat was noted as well as the other physical characteristics; 41% water was used on the stucco and retarded stucco, and where sand was used as well the water was held at 24%.

TEST NO. 1

Stucco set "as is"	30 min.
After 1 min. mixing, set	9 min.
After 2 min. mixing, set	5 min.
After 3 min. mixing, set	Mass set in machine

TEST NO. 2

Retarded stucco set "as is"	7 hr.
After 1 min. mixing set	6 hr. 11 min.
After 2 min. mixing, set	5 hr. 10 min.
After 3 min. mixing, set	5 hr. 0 min.
After 4 min. mixing, set	4 hr. 50 min.
After 5 min. mixing, set	4 hr. 35 min.
After 10 min. mixing, set	1 hr. 57 min.
After 15 min. mixing, set	1 hr. 27 min.
After 20 min. mixing, set	1 hr. 12 min.
After 25 min. mixing, set	1 hr. 3 min.
After 30 min. mixing, set	0 hr. 52 min.
After 35 min. mixing, set	0 hr. 42 min.
After 42 min. mixing, set	0 hr. 40 min.
After 48 min. mixing, set	Mass set in machine

The set plaster resulting from mortar taken from the mixer at the 4-min. period on to the end of the operation was worthless as regards strength.

TEST NO. 3

Three parts of pit sand to one part of retarded stucco used in the following test:

	Setting time
Material set with sand "as is"	7 hr.
After 1 min. mixing wet	5 hr. 50 min.
After 2 min. mixing wet	5 hr. 25 min.
After 3 min. mixing wet	5 hr. 10 min.
After 4 min. mixing wet	†4 hr. 50 min.
After 5 min. mixing wet	†3 hr. 35 min.
After 10 min. mixing wet	*
After 18 min. mixing wet	*
After 30 min. mixing wet	*

*These two pats did not set after standing several days and finally dried out to a material that crumbled in the hand.

†These pats gave plaster that was of poor quality and had very little strength; and from the 3-min. period the plaster appeared dead and very low in plastic value.

The acceleration of the set, and the weakening of the resulting plaster are probably due to several factors, the explanation of which is purely theoretical. In the case of the unretarded material, crystallization starts immediately upon wetting the stucco and as fast as these minute particles of raw gypsum are formed they are broken by the agitation and scattered through the mass tending to still further accelerate the set. Towards the end the acceleration is so rapid that if it were possible to stir extremely rapid, thus breaking up the crystallization completely a non-setting, mud-like substance could be obtained.

In the case of the retarded stucco, the retarder here acts as a protective colloid, which if removed crystallization could proceed. It is pretty well established that retarder does not actually retard crystallization in the sense that the crystal formation starts from the wetting and continues slowly to its final end, but that the retarder merely delays the first crystal formation, and once this formation starts the reaction completes itself in a short time.

Each particle of gypsum stucco with its coating of retarder probably has been coagulated by the mechanical abrasion due to the continued mixing and grinding of the particles on each other, and once the reaction has started it completes itself very rapidly.

In the two latter tests the crystal rupturing has proceeded to such a stage that towards the end of the operation the mortar would not, in the popular conception, set, but actually the plaster has completed the crystallization process and the crystal bonds had been broken as fast as formed.

On the job, where the plaster is used and mixed mechanically, the above conditions are seriously aggravated by the fact that the mixer is already more or less dirty and crusts of set plaster are plentiful, thus providing a source of raw gypsum to help speed up the reaction.

From these tests and from work in the field, mechanical mixing is a dangerous operation if prolonged over two minutes. From three to four minutes yield a wall that is pasty and slow to dry out and a weakening of strength. Four minutes or longer of mixing gives a wall that is worthless.

Dry Mixing at the Mill

At the mill the retarder is added to the stucco at the mixer just previous to sacking, and as this former operation is conducted on the "batch" basis, it is very easy for the operator to leave out the retarder entirely, or worse, to put in a double dose. In either case the plaster would be worthless for the purpose intended.

If the trade understood that plaster was made on the batch basis, dealers would not be so alarmed when they find a sack or so that is defective. As it now stands, let one sack be bad and the whole carload becomes defective, in the eyes of the dealer, and has to be returned; whereas a little examination of the shipment would, in most cases, reveal the poor material and thus save endless confusion and freight as well. Examination at the mill would located defective material, the sacks could be removed and the car reshipped.

The mixing operation is usually a simple one. The operator adds a weighed amount of fiber and retarder (or accelerator) to the stucco, dumps the charge into the mixer and allows the batch to mix thoroughly and then discharges the load. That is about all there is to it, but in practice the condition is complicated by the necessity of tonnage—*speed* in other words.

As the mixer usually holds a ton (or less) this means, for a production of 150 tons per 8 hours, that the operator must perform the cycle of operations, 150 tons in about 7 hours, day in and day out, months on end, without making a slip. The right amount of retarder must be weighed out for each ton of stucco and added to the charge, not added twice or left out but just once; likewise the fiber. The batch must mix, and while it is in the mixer the operator prepares the succeeding batch. The chances of error in most mills at the mixer are so apparent that salesmen and others who have a smattering of knowledge of the business blame all the troubles that they encounter on the job to the poor mixer man. Short-working plaster is blamed on this poor soul, plaster that will not carry the sand is caused "by him," when as a matter of fact there is nothing that the mixer man can do short of sabotage that will make these defects enumerated. However, he can make fast or slow-setting plaster, uneven setting plaster. With proper training and mechanical devices to make his operation fool-proof these possibilities can be practically eliminated.

One point that many mill superintendents overlook is the necessity of educating the

mixer man to do his different duties in the same sequence. Thus by doing his work in the same identical manner, time after time, it soon becomes part of his nature and if he should do something irregular he subconsciously becomes aware of the fact.

To the plaster-mill superintendent, or chemist, who has gone out on the job and found plaster setting up in the mortar box before it could be applied to the wall, or who has had to spray rooms with zinc sulphate or other chemicals to get the material to set, it has been apparent that these troubles are mostly due to improper use of retarder. The following description of mechanical devices and chemical tests to overcome these difficulties will be of interest.

Safety Precautions in Mining

One scheme that is used in a western mill to insure the presence of retarder in fibered hardwall plaster is that when this product is being made, the fiber is weighed out (before shredding) in a pair of small pan scales. Similarly the retarder is weighed out. These two pans are fastened together with a small chain so that the operator in putting in the fiber is compelled to dump the retarder as well. It can thus be seen that the presence or absence of fiber in the finished product indicates the presence or absence of the retarder. This scheme, of course, only can be used on fibered plaster or some other easily detected ingredient.

Still another mechanical device, which is used for the same purpose, is a safety device so constructed that it is impossible to dump the charge from the weighing hopper until the retarder is added.

The mixing operation here is usually conducted in a machine similar to the Ehrsam mixer, and in this case the batch of stucco is run by a screw conveyor to the weighing hopper which holds usually one ton. When the predetermined weight of stucco has been fed into the weighing hopper, the clutch or belt tightener automatically trips and stops the flow of material. The operator then by means of a lever drops this charge into the mixer below, after first putting the retarder on top of the charge in the hopper.

In the use of this safety device the retarder is weighed out in the usual manner and is dumped into the pan *A* (Fig. 1), which is supported on the edge of the weighing hopper by means of the bearing *C* which, when the retarder is placed in the pan, drops and rests on the top of the charge of stucco. Fastened to the pan by the bail *D* is a rope or flexible wire *F*, which passes over pulleys *E* to the small cam *G*, which is so located that when the retarder dumping pan is empty, the cam holds the stucco dumping lever in place, and only when this cam is lifted can the stucco in the weighing hopper be dumped into the mixer.

Variations of this scheme can be made to suit most any local condition and by the exercise of a little ingenuity a foolproof device can be perfected and eliminate by a stroke, a world of troubles that ordinarily come to the lot of a plaster manufacturer.

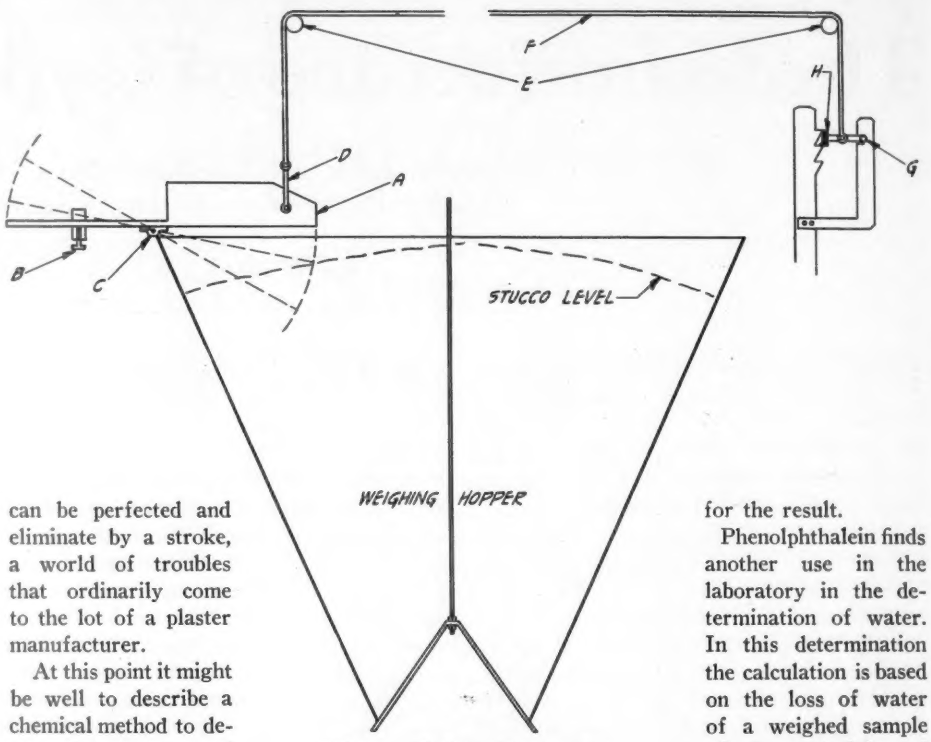


Fig. 1. Safety device for proportioning retarder

At this point it might be well to describe a chemical method to detect the presence of retarder very quickly. If a drop of an alcoholic solution of phenolphthalein is allowed to come in contact with retarder plaster the slight alkalinity of the retarder causes the indicator to turn pink. Too strong a solution is not desirable. Stucco properly calcined will not show any reaction to this indicator.

By using a standard solution of the indicator and conducting the operation in a standard manner, it is very easy to get a rough quantitative determination of the amount of retarder present in the sample under investigation. One pound of retarder per ton of stucco shows a delicate pink and it requires several seconds for the color to develop, while 6 or 8 lb. per ton give a strong color at once.

At one western mill a 5-gal. bottle of this indicator is supplied to the sacking crew, and one man in that crew takes and tests regular samples by this method.

The same scheme can be applied to determine the difference in the kind of plaster in a shipment, as often through error in the shipping department stucco or unretarded material gets into the car. This stuff can be easily segregated by this manner.

If the gypsum rock contains a high percentage of lime or other alkali carbonates a high temperature or some other unusual condition might cause decomposition of the carbonates liberating free lime, which will effect this indicator. Or if the retarder does not have this alkalinity the addition of a small amount of alkali to the retarder will not hurt matters.

This method of determining the amount of retarder beats the old method of grabbing a sample, mixing with sand and water and then waiting patiently five or six hours for the result.

Phenolphthalein finds another use in the laboratory in the determination of water. In this determination the calculation is based on the loss of water of a weighed sample of the material, and care must be taken to see that all the water is driven off and still no carbonates decomposed. After the heated material is weighed, before calculation, by applying a drop of this indicator the presence of free lime is indicated, in which case the analysis should be repeated using a lower heat.

On other other hand, a weak solution of the indicator as used above will show if the material has been dehydrated at too low a temperature, and if this is the case the small pat will set. Also in this case the determination should be repeated for extreme accuracy. Completely dehydrated gypsum will not set without the addition of some chemical to start the reaction.

Unmixed Plaster

Another common source of defective plaster is faulty mixer operation, due to the operator dumping the weighing hopper, and at the same time having the mixer discharge gate open. This results in the charge going direct to the sacking hopper unmixed.

This trouble shows itself when complaints come in that "some of the stuff sets in the mortar box and some will not set at all." The possibilities of this happening can be easily overcome by attaching a rod to the mixer discharge dump lever in such a manner that when the mixer gate is open it is impossible to dump the weighing hopper. This scheme can be better understood by referring to Fig. 2. Here lever *A* is used to dump the mixer by means of the member *C*. Raising this lever dumps the mixer and lowering again closes the gate. By fastening the extra rod *B* to this lever in such a manner that it comes up and under lever *D*, thus preventing it from being lowered (dumped) until the rod *B* has been

dropped to the closed position as mentioned.

Leakage of the weighing hopper is still another possible source of trouble and this as well as the mixer discharge gates should be examined daily. Checking the weights of material in the mixer should also be done at frequent intervals to see if the automatic weighing device is functioning properly. This can be easily done by noting the number of sacks of plaster secured from each batch. Test weights for the retarder scales should be on hand and used.

Frequently complaints come to the attention of the chemist that the plaster does not set evenly. The complaint most common is that there will be isolated spots from several feet in diameter to a fraction of an inch, that will not set up properly, and it is necessary to spray these spots to keep them wet and thus prevent "dry outs." Sprinkling with a solution of zinc sulphate will usually cause these spots to set up rapidly. In this case several applications of the sulphate are usually necessary to get the plaster to set clear back to the lath, as the first application will be apt to form scum on the outer surface. Complaints of this character can be usually traced to uneven mixing or still more probably, lumpy retarder.

A good plan is to have a retarder storage box handy to the mixer operator large enough to hold a day's run, and all the retarder dumped into this box should be screened through a screen of ⅛-in. openings. By filling up the box every morning and then withdrawing the material from the end of the box a cross-section or average of the different sacks of retarder dumped will be used in each batch of stucco and thus any inequalities of the retarder will be offset.

Retarder has a tendency to become lumpy on standing any length of time and though these lumps may be soft, they are not ground up by the mixing and sacking operations to the extent popularly supposed. The best and safest way is to provide some sort of a screening device for this product.

Time in Mixer

The usual tonnage of fibered hardwall plaster from each mixer will depend on the size of the mixer, sacking equipment, distance required to truck sacked material, skill of the sacker operators, etc. On an installation with a 1-ton mixer and a 3-tube Bates packer, two sackers should turn out 125 tons per 8 hours or roughly 20 tons per hour of actual sacking time. As some of this tonnage has to be loaded into cars, some put on the floor for storage and some sent to truck haulers, a loss of time occurs so that actually the sackers are not sacking over 6½ to 7 hours of the day. Based on this actual sacking time, each batch would then be in the mixer theoretically 3.1 minutes, but again allowing for filling and emptying, etc., the mixing time will for this tonnage run about 2 minutes to the batch.

Considering that roughly 7 lb. of retarder has to be mixed with 2000 lb. of stucco, it might be questionable whether or not the time allowed was great enough. Experiments in the mill showed that even as low as 1 minute per batch was sufficient, when six or more pounds of retarder per ton was used; but where a product was made that required

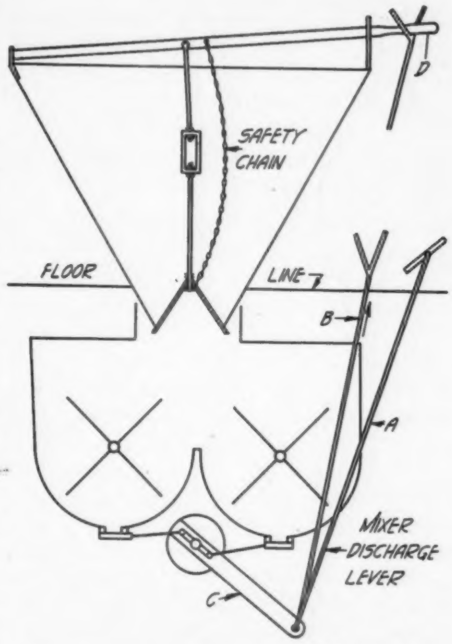


Fig. 2. Safety device for interlocking mixture discharging gates

3 lb. of retarder per ton, the mixing time had to be extended to secure uniform setting times. Where only a few ounces of retarder per ton is used, as is the case with some grades of casting plaster, the mixing time had to be extended to 5 minutes per batch to get good results.

The trials were conducted in the following manner: The mixer was first examined for possible leaks and to be sure that all the paddles were in place. Each batch was then allowed to stay in the mixer a predetermined time and then dumped to the Bates packer below, where each sack was carefully sampled. The samples were then tested for setting time both with and without sands, depending on the amount of retarder used.

This plaster was sent out on different jobs and the setting times there were satisfactory, thus demonstrating that 1 minute in the mixer is sufficient for this class of material.

However, when small amounts of retarder were used there was a more marked difference in the setting times. To illustrate this the following table shows this variation when 3 lb. of retarder per ton was used at the various mixing times. These samples were set neat and the setting time of 10 of the sacks is given for convenience:

Similarly very pronounced results were obtained when 1 lb. of retarder per ton was used and mixed at the various times. It is unnecessary to give the results in detail here, but it is sufficient to say that to secure uniformity under these conditions the charge should stay in the mixer 5 minutes.

The above trials were conducted in an Ehrsam 1-ton mixer of the double-drum type, 24 paddles per shaft and running 100 r.p.m.

By placing a drop of phenopthalein on the samples under investigation the evenness of the distribution of the retarder can be visibly demonstrated.

(To be continued.)

TRIAL NO. 1. TIME OF SET WITH MINUS 10-MESH SAND: 7¼ LB. OF RETARDER PER TON USED

Mixing time—minutes.	1	2	3	4	5
Setting time expressed in hours and minutes.	4:55	5:20	4:40	4:55	5:10
	5:25	5:20	5:00	5:10	4:55
	5:40	5:35	5:00	6:00	5:00
	6:10	5:45	5:10	5:10	5:10
	5:00	5:35	5:30	4:40	4:55
	5:50	5:40	5:40	5:10	5:10
	5:10	5:50	5:40	5:40	4:40
	6:10	5:50	5:50	4:50	5:40
	5:50	4:50	5:50	5:10	5:25
	5:50	5:00	5:30	5:00	5:00
	4:55	5:00	5:10	5:55	5:55
	5:00	5:00	5:40	5:30	6:00
	5:55	5:30	5:00	5:00	6:00
	5:50	5:40	5:30	6:00	6:00
	5:50	5:40	5:55	4:40	5:00
	5:40	5:40	5:50	5:00	5:40
	5:10	5:50	5:40	5:00	6:00
	5:20	5:30	4:55	5:50	5:00
	5:20	5:10	5:10	5:40	5:40
	5:30	5:10	5:50	6:00	6:10

TIME OF SET WITH MINUS 10-MESH SAND: 3 LB. PER TON RETARDER

Mixing time—minutes.	1	2	3	4	5
Time of set in hours and minutes	4:00	5:00	5:00	5:00	5:00
	7:00	6:00	5:00	5:40	5:00
	4:40	5:30	4:30	5:00	5:00
	6:40	6:20	5:00	5:10	4:50
	5:00	5:50	5:10	5:20	5:10
	4:30	4:30	5:10	5:00	5:00
	7:30	4:40	4:50	5:00	5:00
	4:30	5:00	5:00	5:30	5:20
	6:00	5:50	4:00	5:10	5:00
	4:30	4:50	5:00	5:00	5:10

Hints and Helps for Superintendents

New deviation line built at the Maria Island quarry

Cutting Costs by Eliminating Cableway in a Limestone Quarry

By WALTER J. PITT, A.A.C.I.
Maria Island, Tasmania

CONSIDERABLE study has been made of the economic development of producing raw materials for the manufacture of portland cement, and at our own plant at Maria Island, Tasmania, it was found that a good-sized saving could be effected by eliminating the cableway between the quarry floor and the railhead at the quarry rim. From the railhead the cars were hauled to the crushing plant by a steam locomotive. The old method was to haul five 1-yd. standard steel trucks, or cars, up a steep inclined track by means of a winch driven by steam supplied from a portable Garrett engine. Loading in the quarry was done by hand and when the five cars were filled they were hauled to the top of the cableway and coupled to other cars to make a train of 11 trucks to be hauled to the crushing plant. Returning from the crusher, the train of empty cars was split into two sections, and each section, attached to the steel cable, was allowed to run to the quarry by gravity.

The changing over to the new system of delivery meant cutting a deviation down to the quarry floor to carry the tracks to the lower level, and this cost about $2000. The Garrett engine was scrapped, as were the winches and the haulage equipment. Eliminating the cableway dispensed with the labor which had operated it, and at the same time it permitted the steam locomotive to be at work all of the time. Formerly, quite a lot of the locomotive's time was taken in waiting for trains to be made up. The system embodies a quick pickup of the rakes, increased number of rakes and hence more stone for the mill. An engine with a rake of 11 trucks can now run from the crusher to the quarry floor via the deviation, pick up the loaded trucks and return them directly on the return journey.

The labor costs under the old method, when only 150 trucks could be loaded and delivered to the crusher in a day, were:

(Amounts shown are on a daily basis.)

1 Quarry foreman	$ 5.00
1 Locomotive driver	3.84
1 Portable-engine driver	3.80
1 Steam-winch man, for hauling	3.80
1 Fireman	3.48
1 Fettler	3.36
1 Man for coupling trucks	3.48
1 Powder monkey	3.84
10 Quarrymen and spallers	33.60
2 Tool sharpeners	7.20
6 Popper machinists (hammer drill)	21.60
2 Popper machinists (heavy machines)	7.60
	$100.60

English rates of pay have been converted into the American equivalent for convenience.

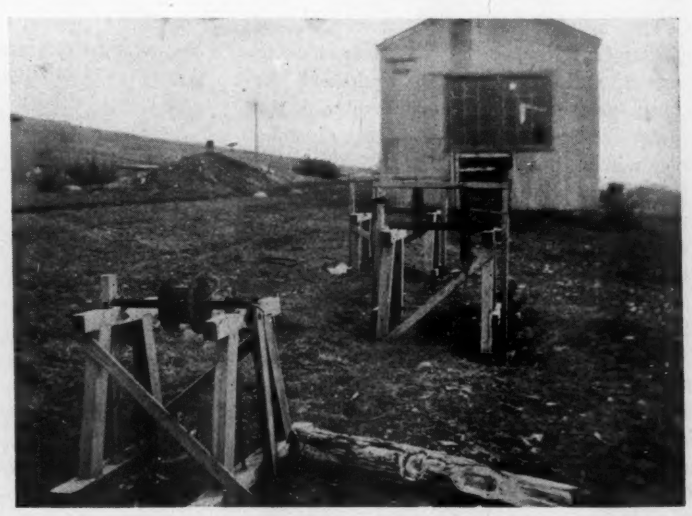
Under the new system the costs are the same except that the following labor is dispensed with:

A portion of the new line with the location of the old cableway at left

1 Portable-engine driver	$ 3.80
1 Steam-winch man	3.80
1 Fireman	3.48
	$11.08

At the same time it is possible to load and deliver 300 trucks to the crusher daily. Hence it is possible to double the output of the quarry and reduce the labor costs of getting the stone out by $11.08 every day.

Type of cars used at the Maria quarry which are now drawn directly to the crusher by a locomotive



Portable engine house and cable sheaves which were used on the old cableway

In this operation the height of the quarry face is approximately 70 ft., made up of 5 ft. of marine shale underlying the limestone band. The latter is made up of fossil shells 15 ft. thick, and is covered with about 50 ft. of overburden.

Signs Point the Way for Visitors

AT the Sandt's Eddy plant of the Lehigh Portland Cement Co. a very complete system of signs makes it possible for a visitor to go through the entire plant and follow the course of the material from the crushing plant to the packhouse. On each sign is a number and an arrow pointing to the sign with the next number in the series. Beside giving direction, the signs explain the process, a few sentences telling the visitor what to look for in the way of machinery or equipment, and what its purpose is. All the signs are permanent, made in blue enamel on a white background, and each bears, like the one shown, a warning to be careful.

The first of the signs, shown here, is at the rear of the office through which, of course, the visitor must pass after obtaining the necessary permission to view the plant. These signs take the place of a guide, as they contain all that is necessary for a person of ordinary intelligence to inform himself of the steps of cement manufacture.

One of the signs used to direct visitors around the mill

Floating Support for Tailings Flume

AT the operations of Gemmer and Tanner movable plants are used in the flat deposits near Columbus, Texas. The waste and the water used in washing are run back into the worked out area, and it was necessary to devise a method for moving the tailings flume easily whenever the plant was moved. The method shown in the picture was finally worked out.

The part of the flume that is over the water is supported on bents which are mounted on a framework. This is supported either by empty barrels or by a pontoon. Whenever the plant is moved the flume can be floated to a new place with no time lost.

The connection with the portable plant is shown in one of the pictures and it will be noted that the flume is supported by a wire running from the top of the plant, and this is enough to keep the flume from sagging.

A similar arrangement might be used in any operation where tailings are run into a pond and it is desirable to spread the waste.

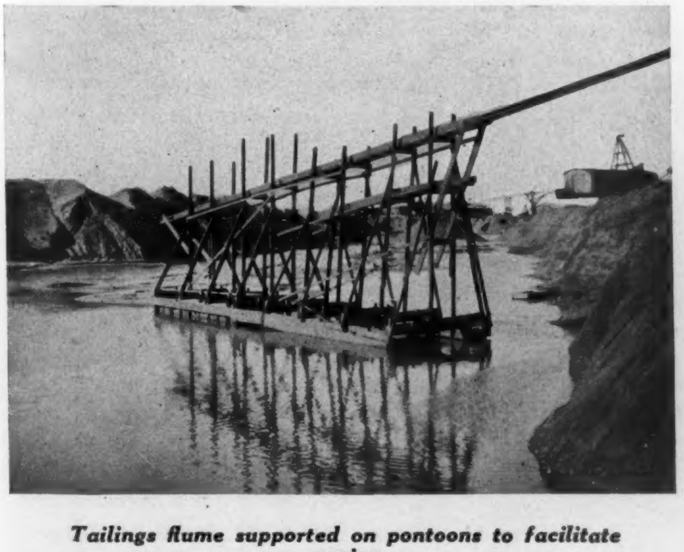
Locating Hidden Cracks or Leaks in Tools or Castings

By W. T. WALLACE
Lee Lime Corp, Lee, Mass.

OFTENTIMES cracks occur in castings, pipes and other pieces of machinery, which are not at all evident to the naked eye. Further it is hard to determine whether leakage is from a crack or not. I have found the following simple method to be of service and positive in locating the source of trouble.

First the suspected object is made perfectly clean and then some common white chalk is marked all over the places where the supposed crack is located. From an ordinary oil can filled with gasoline, the gasoline is squirted on the surface opposite the suspected leak. If there is a hole or crack of any description, the gas will come through and show up the exact source of trouble by the immediate discoloration of the chalk.

As an indication of the above in locating cracks, the following occurred at our plant: The cylinder of a sinker drill was suspected of having cracks, for it looked as if the oil was coming through in several places. After wiping it clean, there was no evidence of any cracks on the surface. I then chalked up the outside of the cylinder, put in a plug of waste and poured in a cup of gasoline. The chalking test showed four distinct cracks which we could otherwise not have found under ordinary methods.



Tailings flume supported on pontoons to facilitate moving

View of the floating tailings flume showing connection to the screening plant

Penn-Dixie Improves No. 3 Plant

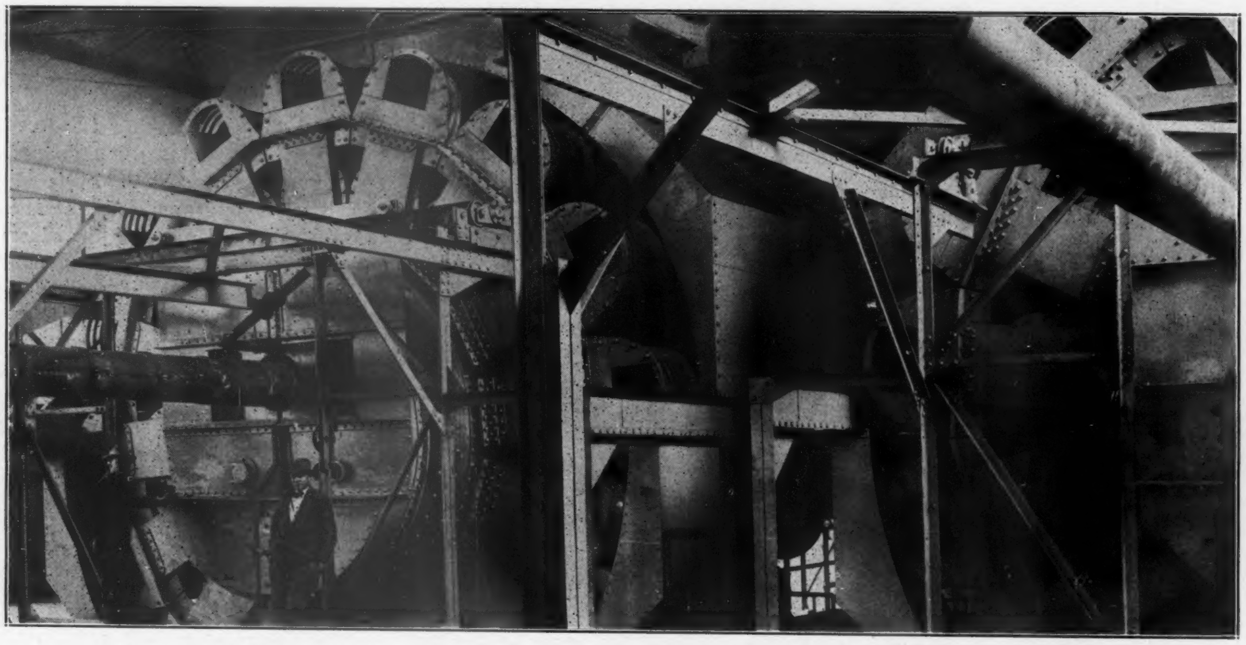
Very Long Kilns with Special Coolers and Large Slurry Storage System Installed

PENNSYLVANIA - DIXIE CEMENT CORP. Plant No. 3 at Richard City, Ala., was described in ROCK PRODUCTS for October 18, 1924, at which time it had been changed over from the dry to the wet process and practically rebuilt throughout. It was then the plant of the Dixie Portland Cement Co. Since that time it has undergone another transformation due to the policy of keeping the plant up-to-date and in line with recent improvements in cement mill machinery and practice. Some of the new features are described in the *Penn-Dixie Doings,* the company's house organ, for April, from which what follows is abstracted:

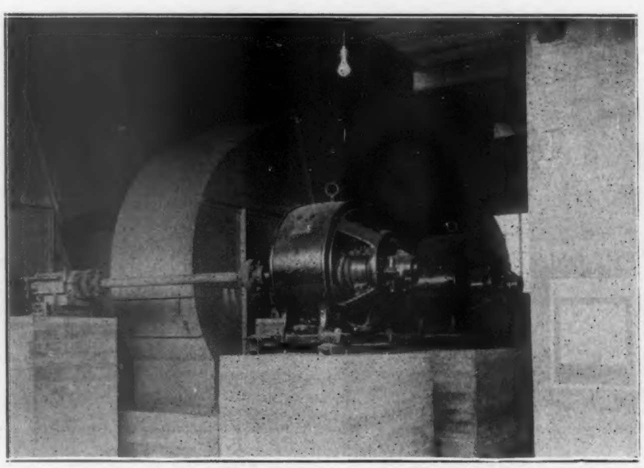
The most notable improvement has been the installation of two kilns of the largest type. The original kilns in the plant were 60 ft. long. New kilns are 343 ft. long, 11 ft. 3 in. in diameter for part of the length and 10 ft. the rest of the way. These are very large kilns. There are none larger in the world and only two that are as large. In fact they are the largest moving machinery units that were ever built.

Each kiln is mounted on five sets of trunnions and driven through a girth gear at the center. Each takes about 50,000 fire brick to line it. One of the interesting features of these kilns is the use of chains which are suspended in loops for a distance of 100 ft. from the feed end. There are 563 of these ⅝-in. chains, each 12 ft. long, which means that there is a mile and a quarter of chain to each kiln. Their function is to intercept the slurry, which contains 35% of moisture, and thus obtain a large drying surface.

Another feature of the new kilns is the method of cooling the clinker. The 343 ft. length of these larger kilns includes the section comprising the "Unax" cooler, designed by F. L. Smidth & Co. This consists of two rows of cylinders, 3 ft. in diameter and 14 ft. long, superimposed in two circles around the circumference of the burning end of the kiln. There are 32 of these cylinders integral with and in motion with the kiln. The clinker falls through grid openings in the shell of the kiln into the cooling cylinders of the inner circle and by means of an ingenious arrangements of flights and chains it is impelled backward until it falls into the outer circle, where the direction of travel is reversed and becomes the same as that of the material in the kiln. The discharge is through openings in the ends of the cylinders of the outer circle.



End of kiln showing the double circle of cylinders in which the clinker is cooled



One of the fans which draw off the kiln gases

The firing is with powdered coal and the pipe through which it is injected passes into the kiln to a point beyond the cooling section. The air which passes through the cooling cylinders just described is thus preheated and conveyed through ducts to the fans supplying the air for powdered coal injection. The air entering the kilns directly is also thus preheated.

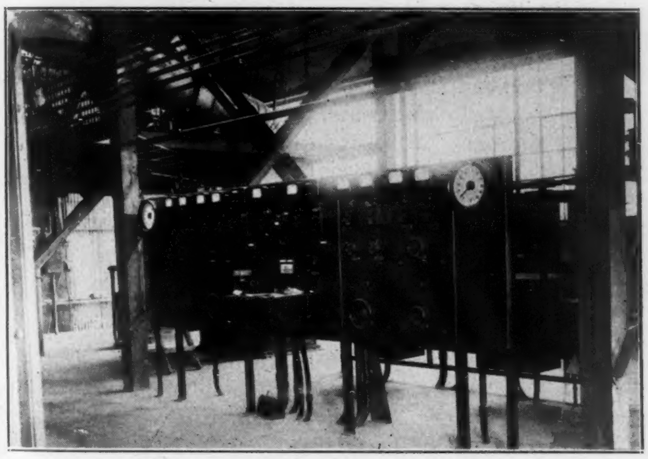
The draft is supplied by two large fans placed at the rear ends of the kilns which draw off the kiln gases and discharge them into the 150-ft. stack. These fans are regulated by a remote control automatic device on the burner's platform which is actuated by any

The two 343-ft. kilns, shown near the point where the diameter changes

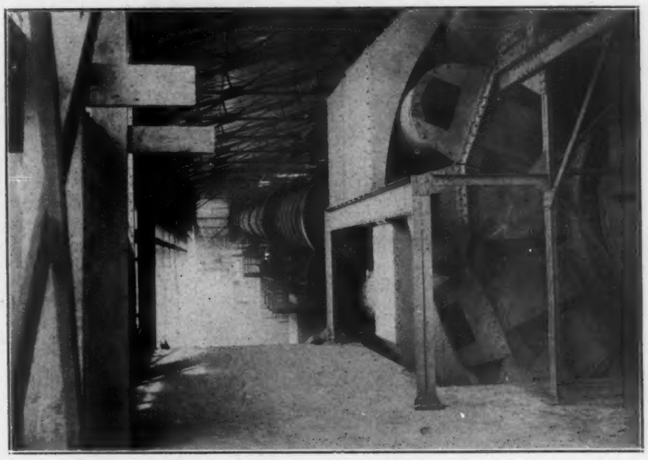
change in the draft conditions and maintains a uniform draft by varying the speed of the fans.

The slurry feed to the new kilns is taken from a large new storage basin, with a capacity equivalent to 5000 bbl. of cement. This basin is equipped with a traveling agitator carrying rotating arms. This agitator, which is equipped with air nozzles for lateral agitation, traverses the length of the basins and automatically reverses its direction when it reaches the end of its travel.

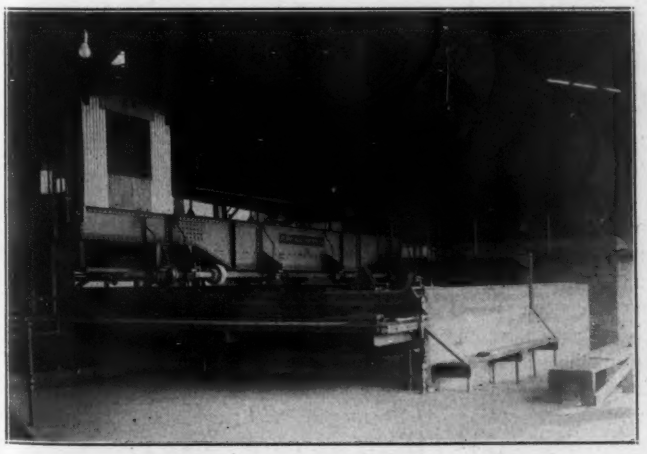
Pumps lift the slurry to the top of the kiln building, where "Unax" feeders supply a regulated quantity to inclined pipes dis-



Kiln control panel



Side view of kiln



Slurry storage basin and traveling agitator under kiln

The traveling agitator, which reverses automatically at the end of its travel

charging into the kilns. The general layout at the rear of the kilns, comprising the feeders, dust collection system, fans and dampers, represents minute attention to every detail contributing toward an efficient operation.

The passage of material from the time it enters the kiln as slurry until it is discharged as portland cement clinker occupies about four hours. Although the operation is on a large scale, every detail is under precise control. The control panel on the burner's platform carries switches controlling the speed of the kiln, the feed, and the stopping and starting of the various fans, and the coal feed and other apparatus connected with the burning. Signal lights indicate conditions existing at all times in conjunction with draft dials and pyrometers, so that the operator can tell by a glance at the control panel the speed of each kiln, the draft, condition of the damper system, the temperature, and whether or not a proper supply of slurry is entering the feeders, in their remote location at the top of the opposite end of the long building.

Other general plant improvements include the installation of a Fuller-Kinyon conveying system for handling pulverized coal.

Colloidal Behavior of Lime

ACCORDING to the colloidal theory for the slaking of lime, an irreversible colloid is formed during the slaking. If, in the slaking process, only sufficient water is used to produce a dry hydrate, the colloids are destroyed during the drying out of the hydrate and, upon subsequent treatment with water, will not again assume the colloidal state. But if sufficient water is used to leave the slaked lime as a wet putty, the colloidal properties are retained. The colloidal material present modifies the properties of the lime putty and causes the differences observed between the putties made directly from the quicklime and those made by soaking the dry hydrate. It is thought that plasticity, as well as some other properties of lime, depends upon the presence or absence of colloids. This latter supposition conforms with the known fact that most high-calcium quicklimes, when slaked directly, give a putty that is plastic and has a low rate of settling from water suspension, while if the quicklime is hydrated to a dry hydrate which is then soaked in water, a more non-plastic and a more rapidly settling putty is obtained.

It is also known that the dry hydrates, from certain dolomitic quicklimes form plastic putties upon soaking, while those from other dolomitic quicklimes do not. This is because the magnesia of the quicklimes which give the plastic hydrates is not completely hydrated during the original hydration at the plant, and that the non-hydrated magnesia slakes during the soaking on the job. This would form the colloids necessary for plasticity. Magnesia of the quicklimes giving the non-plastic hydrates either completely hydrates during the hydration or else is so hard-burned that it does not hydrate during the soaking. In this case no colloids would be present in the putty to make it plastic. Plastic limes can be mixed with more water before they become sloppy than the non-plastic hydrates. This is another indication of the presence of the colloids in plastic putties, and of their absence in non-plastic ones. The colloidal jelly-like structure of the plastic putty would require more water to produce fluidity than would be required in the non-colloidal, non-plastic putty.

Certain salts and chemicals, when present in the water used in the slaking of a quicklime, affect the properties of the putty formed. This again indicates electrically charged or colloidal particles, and much of the action of the salts upon the lime putty can be predicted by assuming that the lime putty is colloidal.

In this way the colloidal theory seems to explain very well some of the facts of the behavior of lime. However, the actual presence of colloids in a plastic lime putty has never been definitely proved, nor has the absence of colloidal particles in putties made from completely hydrated dry hydrates been proved.

The authors made experiments on high calcium hydrates and Ohio plastic dolomites, measuring the effect on the settling rate (of small quantities in water) of differences of electrical potential. The effect of the electrical charge was shown to be as much as 50% of that of gravity, a proof of cataphoresis (migration of colloidal particles) in the case of the plastic hydrates. Little effect was shown in the experiments with non-plastic hydrates. The cataphoresis shown is dependent on the colloids present, as it is a colloidal phenomenon, and one of the conclusions drawn is that it is related to the plasticity shown. Putties made by slaking quicklimes with excess water exhibit marked cataphoresis and are very plastic. The hydrates that do not give plastic putties after soaking never show much cataphoresis either before or after soaking.

The pressure of colloids gives the property of not drying out rapidly because the electrical charges held cause the films of water surrounding the colloidal particles to be attached more firmly. According to the theory of Bancroft and Freundlich the positive charge carried by the particles is acquired by the adsorption of some Ca ions. These are held firmly so that the particle with adsorbed ions acts as a single positively charged unit. This attracts negative OH ions in its vicinity causing a concentration of solution near the particles, according to Donans membrane equilibrium theory. By a somewhat lengthy discussion it is shown that water will flow into this film surrounding the particles, due to the development of osmotic pressure. The removal of this water film must therefore be done against osmotic pressure and energy must be supplied. This makes the drying out of the putty much slower and more difficult than if the particles were not charged.—Kenneth W. Ray and Frank C. Mathers in *Industrial and Engineering Chemistry* (May, 1928).

[Cataphoresis is the migration of colloidal particles in an electric field. The direction of the migration is dependent on the sign of the electrical charge on the particle.—Editor.]

Concrete Materials Tables

BULLETIN NO. 4, of the National Sand and Gravel Association is called: "Tables of Quantities of Materials for Concrete." It is prepared by the engineering and research division of the association, of which Stanton Walker is the director.

In the introduction Mr. Walker reviews the tables given by Taylor and Thompson, now rendered somewhat out of date by later knowledge of concrete, and those prepared by Prof. Abrams and himself published as Bulletin No. 9 of the Structural Materials Research Laboratory. These, he points out, do not provide a convenient basis for determining quantities for arbitrary mixtures, as they are limited to designed proportions for different strengths of concrete. And they do not make allowances for differences in void content of aggregate due to variations in grading.

The present tables take into account the *fundamentals* of concrete volume, the volume of solids in the cement and aggregates and the volume in the mixing water. The method of calculating the quantities of materials used is that devised by Mr. Walker and published in "Estimating Quantities of Materials for Concrete," Bulletin No. 1 of the National Sand and Gravel Association.

One of the principal advantages of the new tables is that they can be used for proportioning arbitrary mixtures, and ten groups of tables are given for mixtures from 1:1:2 to 1:3:6. In each group are several tables, one for each quantity of water used, as 5 gal. or 7 gal. per sack of cement. A column at the left of each table gives the voids in the coarse aggregate and the heading for each column following gives the voids in the sand. As an example, if it is desired to find the quantities for a 1:2:4 mix, using 7 gal. of water per sack, the coarse aggregate containing 40% voids and the fine aggregate 30% voids, reference to the table shows that the mix should contain 5.2 sacks cement, 0.38 yd. fine aggregate and 0.76 yd. coarse aggregate. Void contents between those given in the tables may be used by interpolation and the book shows how this may be done and gives other examples for the use of the tables.

So long as arbitrary mixes must be used, as they must be for legal reasons in many instances, these tables have a value beyond others which have been published to date.

National Associations of Aggregate Producers Open Laboratories

Sand and Gravel and Crushed Stone Associations Began Research May 1, the Latter in New Headquarters

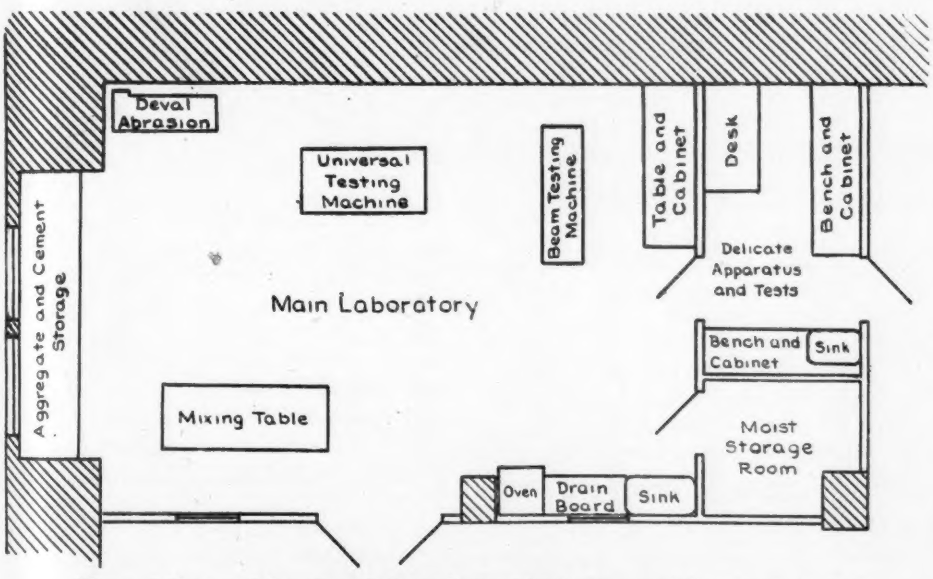
THE NATIONAL CRUSHED STONE ASSOCIATION and National Sand and Gravel Association both opened research laboratories May 1, the Crushed Stone Association in its new headquarters at Fourteenth and S streets, S. W., Washington, D. C. The Sand and Gravel Association has rented more space in the Munsey building, Washington, where its headquarters have been for some years.

In announcing the opening of the laboratory, the *National Sand and Gravel Bulletin*, which is published by the association, says in part:

"The convictions of the board of directors have found tangible expression in the creation of a research laboratory, as a new department of the association, which will be devoted entirely to the problems of the sand and gravel industry.

"It is well to emphasize that a proper research philosophy, which alone can guarantee permanent success and appropriate recognition, involves in no way an undertaking to *prove* something which can be turned immediately to partisan benefit. A research laboratory should be organized in an endeavor to *learn* something about the particular materials which form the basis of the investigation. No other industry in the United States approaches the sand and gravel industry from the standpoint of the wide use of its products. No construction project, if it be structure or highway, is completed without the use of sand or gravel in some measure. We, then, are the manufacturers of the elemental building material, and the duty rests upon us to know more about that material than anybody else in the country."

The policies of the laboratory are controlled by the committee on engineering of the association and it will be under the direction of Stanton Walker, director of the engineering and research division, and C. E. Proudley, assistant director. Both are particularly well qualified for the research work needed. Mr. Walker was long assistant to Professor Abrams in the structural materials research laboratory of the Portland Cement Association and Mr. Proudley was in charge of the concrete research laboratory of the Bureau of Public Roads before taking up his present work.



Plan of National Sand and Gravel Association's new laboratory in the Munsey Building Washington, D. C.

National Crushed Stone Association in New Quarters

The National Crushed Stone Association will have a much larger space than it has had before in its new quarters, about 4000 sq. ft. altogether. Offices and main laboratory will be on the second floor and rooms in the basement will be used for the dusty and noisy portion of the testing work.

The *Crushed Stone Journal* thus describes the new headquarters:

"The offices will be occupied by the clerical force, the secretary, the director of the bureau of engineering and the laboratory engineer. Because of the low rate at which we at present are able to obtain our new headquarters, we deem it advisable to procure ample space for reasonable future expansion in our activities.

"In the laboratory on the second floor there will be installed a testing machine of unusual design, having a capacity of 300,000 lb. in compression, 60,000 lb. in tension and capable of making transverse tests of large or small beams. This machine has been designed for our particular needs and we expect it to be delivered on June 1. It will be used for compression, transverse and tension tests on concrete and special tools are now being designed and built for this work. They are aimed at securing the greatest possible accuracy and the elimination of uncertain factors. At the same time speed and convenience of testing have been kept in mind, for these elements are especially essential because of our small laboratory force.

"Other equipment in the laboratory will include complete cement and mortar testing apparatus, involving a storage tank and moist closet cabinet to be arranged for maintaining constant temperature and the highest possible humidity. A briquet machine of the shot type of 1000-lb. capacity will be used for tension tests of mortar.

"Complete laboratory screening apparatus and rock testing equipment for determining the physical properties of rock, including a four-cylinder Deval abrasion machine and perhaps other machines, such as the standard toughness and hardness devices, will be included. It is also proposed to install apparatus for making freezing and thawing tests. A special repeated load testing machine will probably be built during the year for making repeated bending tests on concrete. Bituminous mixtures will also be investigated for their stability and other properties. Obviously, however, it will be impracticable to initiate all of these investigations simultaneously."

The laboratory work is being directed by A. T. Goldbeck, director of the bureau of engineering of the association, assisted by Joseph Gray, laboratory engineer. Mr. Goldbeck's long service as engineer of tests with

the Bureau of Public Roads, his work with the American Society of Testing Materials and more recently his work with the National Crushed Stone Association, have given him an international reputation as an authority on highway materials and methods of testing them. Mr. Gray has recently been appointed to his position, as is told in an article in the preceding issue, where his experience as a testing engineer was set forth.

The laboratory will contain the essential machines for making tests which show the physical characteristics and also the behavior of the substances tested as concrete aggregate. The plan shown herewith gives the machines and their position.

A considerable program of work has already been outlined, much of which is to obtain information already needed by the industry.

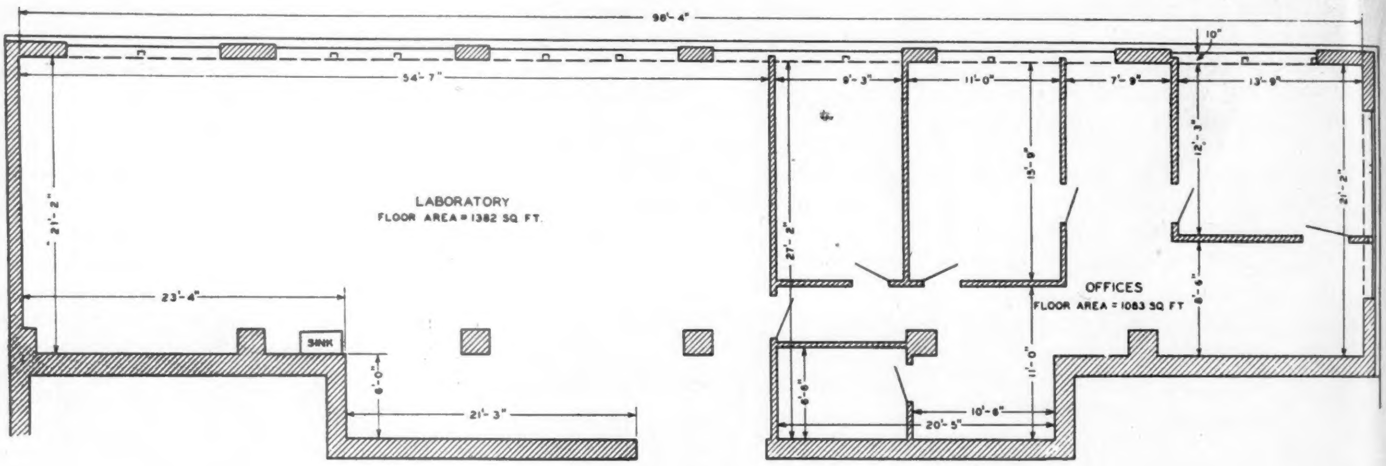
Improve British Cement Plants with Long Kilns

IN order to keep abreast of the rapid development in cement manufacturing technique, the British Portland Cement Manufacturers, Ltd., are completly remodeling their Greenhithe works and are also carrying out a program of extensive alterations and improvements at their Wouldham works at West Thurrock.

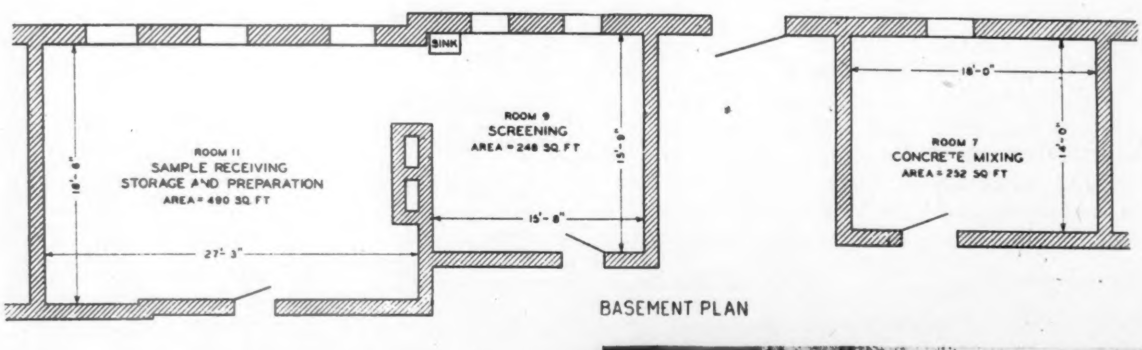
At the Greenhithe works two new rotary kilns of the latest design, and each no less than 300 ft. long, will be installed, the output of which, in addition to the two existing 200-ft. kilns, will be 375,000 tons per annum, an output which is only exceeded by one cement works in this country.

Entirely new and up-to-date plants are being installed for the preparation of the raw materials and the grinding of the finished product. The cement will be stored in eight reinforced concrete silos, from which it will be transferred to the wharf on the Thames in bulk wagons. The cement will be packed on the wharf entirely by mechanical packers and weighers, and it will be loaded direct from this plant into ships alongside by electrically driven semi-portal cranes.

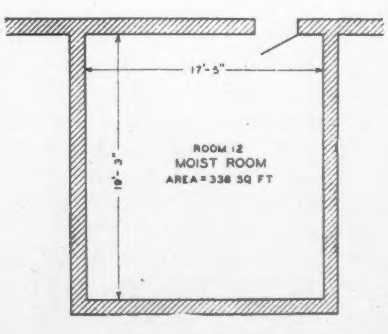
All the machinery and plant for the preparation, mixing and storage of the raw materials at Wouldham works is being brought up to date. Six rotary kilns of an earlier and smaller type are to be scrapped and a new 300-ft. kiln will be installed. With the necessary additions to the grinding plant, these works will have a total annual output of 250,000 tons when these alterations are completed.—*Contract Record* (London, England).

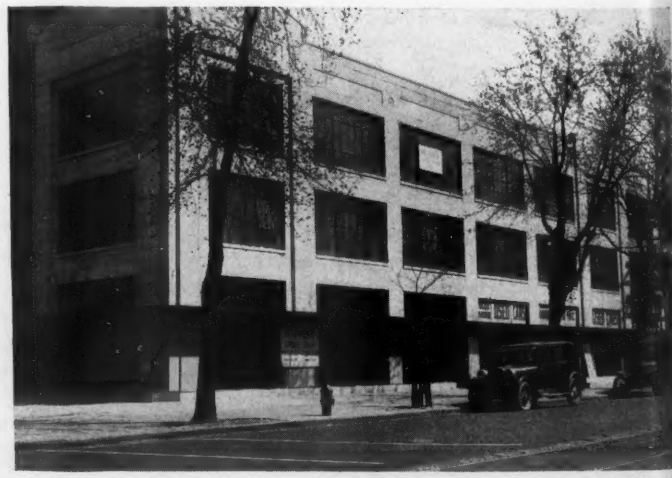


SECOND FLOOR PLAN



BASEMENT PLAN





***Above:** Plan of rooms of the National Crushed Stone Headquarters. **Left:** Exterior of building*

Co-operation Between Plant Surgeons and Safety Committees*

By John L. Rock, M.D.
Oglesby, Illinois

THE subject of my talk was inspired a year ago at a meeting similar in character to this and in this place. After listening to the discussions by the various safety workers throughout the greater part of a day, I began to wonder if the plants represented here really had doctors connected with them. Little or nothing was mentioned of their work and certainly the medical work is a big part of the safety movement. In fact, medical work itself is all safety. First aid is given to keep small injuries from becoming large ones. Large injuries are treated as skillfully as possible to keep them from becoming worse and to restore as much function to the injured part as possible.

How Many Plants Have a Live Doctor on the Job?

I wonder how many of your plants have a real live doctor on the job. If you haven't, I will endeavor to give you a few things to think about in this connection. Safety divides itself into two distinct fields—first, the field of prevention of accidents or keeping accidents from happening; second, field of salvage—after an accident happens the care, beginning from the smallest scratch to the most severe injury. Some of our most severe infections come from a small scratch neglected. Some of our severe injuries if properly cared for in the beginning would turn out not nearly so severe as would at first seem, and give to the injured person a maximum of usefulness later.

It is to the latter field or field of salvage that I will spend most of my time. At the head of this field should be a competent doctor. I think the plant management should spend as much time in selecting their doctor as any other head of a department. Do not select the doctor because he happens to be the superintendent's family physician or is a special friend of some other prominent member of the organization, but select him for his abilities. At this time industrial medicine and surgery is recognized as a definite separate field or specialty in medicine and a doctor to do good work in it should have special training along industrial lines. These men can usually be found connected with the larger industrial concerns such as the U. S. Steel, International Harvester Co., the various railroads, etc., where a large number are employed under a head surgeon. They receive their special training and experience there. In selecting him, go to the chief surgeon and tell him what you want and usually he will recommend one of his men that is especially apt. I would also say a young man who has not been out of school over two or three years is best. He is more enthusiastic and ambitious. You know the American Medical Association classifies the medical colleges of the United States according to quality and best standards of medical training. They classify them as A, B, and C colleges. A denoting best, B, medium, and C, poor. I would select a man from an A class school and one who has had a good hospital internship. His foundation is so much better and it enables him to apply himself to different environments much better. I would also select a man with a pleasing personality. One that the workman can come to and feel that he can talk to and not be awed in his presence. One that can mingle with the men and understand them. You know that is one of the things that is especially troublesome to me. The workman insists on treating me as though I were in a different class from himself, and I would like to feel as though I am one of them. My work and ambitions have transferred me from a farmer boy to a doctor, but as for being any worse or any better I do not feel that I am. Lastly after finding a man that meets the above qualifications, offer him a good salary. Don't be afraid to pay him for his services. He will many times over save his salary for you. You must remember in these days the standards for becoming a doctor are higher than in any other field of endeavor. A man in order to graduate from our first class medical schools, must have spent seven to eight years after leaving high school. Together with the time lost from making money and that spent while getting his training, his investment is greater than in any other profession. Consequently his salary should be some higher.

The Doctor Should Be Paid a Salary and Not by the Case

And, too, I believe he should be paid a salary and not by the case. Doctors are human just the same as the rest of you. If he is paid by the case, the more times he sees the patient, the more money he will make, and it is only natural that he will not be in nearly such a hurry to send the man back to work, as he would if he was getting a good salary—a sure thing. The less he has to do, the easier the work is. You see it really pays him to boost safety. It makes less work for him and yet not less money.

To summarize briefly the things you should consider in selecting your plant surgeon are: first, a man with special industrial training; second, a young man—not over two or three years out of school; third, first class preliminary training; fourth, a man with a pleasing personality and able to adapt himself readily to environment; fifth, a good salary.

If you get a man with these qualifications, you will not be afraid to trust yourself to his care, no matter how severely injured you are, you will know that he will do everything possible for you. It is not hard to get some real safety co-operation out of him.

I believe a doctor should visit the plant each day and spend a certain definite period there. It is the only way he can definitely oversee all the injuries that his department takes care of. If they are sent to his office, many of them never get there, especially the smaller ones. A workman after getting home once rather dislikes to get out again, and the small injuries get neglected.

In one of our plants we have a registered nurse who spends most of her time at the plant, and in the other, we have a trained first aid man who is on duty all the time. They do most of the first dressings and see that the injured person reports to me at my office hour. In this way, I see practically every injury, and have complete control over the department.

In our plants the safety starts as soon as the man is employed. He is given a thorough physical examination. All his physical defects are noted—except in cases of hernia, or previous loss of sight in one eye, these defects do not keep him from being employed necessarily, but are used by the employment agent in placing him in the plant. We almost never employ a man with the defects cited above, because our laws are so unreasonable in these two cases. If a man has physical defects such as poor eyesight, bad heart, etc., the employment agent places him in a department with a minimum amount of danger.

First Safety Illustration

After the physical examination is over—we have a place on our card which calls for previous injuries—we ask him if he has ever been injured before—and this is the opening to give him a little safety talk. We usually warn him that the plant is filled with heavy machinery and that he should be on the alert all the time. That it is dangerous if he isn't. We tell him not to take chances, but be sure he is perfectly safe before attempting to do anything. Also he is told that we have a first aid department here, and on receiving the very smallest scratch, he should report to us for first aid treatment at once. At first this is hard to get done but our safety man usually looks them up and sees that they do report. After a while they get the habit and we have no more trouble.

In the matter of treatment, as stated before, we insist on all injuries no matter how

*A paper delivered before the regional safety meeting of the Portland Cement Association held at LaSalle, Ill., on April 19, 1928.

small, be reported to the first aid department for treatment. After the nurse or first aid man cares for them they are instructed to report back to me at my office hour. In the more severe injuries, I am called immediately and make a trip to the plant office. If the injury gives symptoms of a fracture, it is sent to the hospital for x-ray examination, or if a hospital case it is sent to the hospital and hospital care instituted.

It is the matter of lost time accidents that we feel we give our safety department most co-operation. Lots of cases would lose time unless told not to by the doctor. These beneficiary societies are very conducive to cause a man to lay off at the least excuse of an injury, but if he knows I will not sign his paper, he isn't so anxious. We have lots of cases that are really injured enough to lose time but we get these men back early on a light job. We have to pay them half time compensation if laying off, and most all of them will do more than half of their usual work, so we are ahead in the long run financially. But the big thing about it is this. A working man becomes very restless, and feels lost, and doesn't know what to do with himself the first six or seven days he is laid off. He is easily talked into going to work during this time. But let him stay off longer and he sort of adjusts himself to idleness, and each day it becomes increasingly difficult to get him back to work. I don't believe we have had a man lay off because of an injury to the upper limbs for five years. If he has a broken or injured hand or arm, we get him a one-hand job. Of course of the lower limbs, he cannot do so much as they support the weight of his body. Of course, in getting away with this, the man has to have confidence in the doctor. The doctor must have showed them by example that he knows what he is doing, and that there is no likelihood aggravating the injury.

First Aid Classes

First aid classes are given at the plants occasionally. Men are selected from each department to attend these classes, usually those most apt and most enthusiastic about safety. They are paid for their time and aside from the services they render the plants, it is pointed out that they derive a great deal of personal benefit from it by the first aid service they render themselves and family at home. These classes are given the regular Red Cross first aid course and are given Red Cross certificates when the course is completed. It makes the man a better safety man in that knowing what might happen to small injuries, he insists and sees that the small scratches are taken care of immediately. In several instances, lives have been saved by the quick, efficient work of these trained men—something that requires quick work and would not wait until the doctor could get there. In other instances their work has lessened a severe injury because efficient first aid was given before the injured was moved.

I believe that the doctor should inspect the plant at least once a month, paying particular attention to the health and sanitation and if he sees any unsafe practices, report them to the safety inspector—this I have not done regularly, but only occasionally. Too, the contact with the men in going through helps to better the feeling toward the medical department, and makes them feel the doctor has a real interest in their safety and health.

Doctor Should Attend Meetings

The doctor should attend the safety meetings, too. In one of my plants, I attend these meetings regularly—the time of meeting is always at my office hour at the plant. At the other plant, I attend only occasionally because the time is not quite right to me. I have derived a lot of good, and have learned a lot of things which directly affected my department, as well as having a few of my own suggestions put into force by the safety committee. The contact with the men of the safety committee is invaluable to me.

Program Arranged for Concrete Products Meeting

THE midsummer meeting of the Northwest Concrete Products Association will be held July 16 and 17 at Paradise Inn, Rainier National Park. According to F. R. Zaugg, executive secretary of the association, one half-day of the convention will be turned over to W. D. M. Allan, manager of the Cement Products Bureau of the Portland Cement Association, Chicago.

Mr. Allan will conduct a demonstration of practical methods used throughout the country in advertising and selling concrete brick, building blocks and other concrete products.—*Seattle* (Wash.) *Journal of Commerce.*

Calcium Arsenate Patent Invalid

PATENT 1237815 for a process of manufacturing calcium arsenate was recently decreed invalid, in the District Court for the District of New Jersey, by Circuit Judge Davis. It is reported that the claims of the manufacturing process were found, by the court, to be broader than the invention claimed.

In the manufacture of calcium arsenate, a widely used insecticide, there are formed four calcium arsenates—mono-calcium arsenate, di-calcium arsenate, tri-calcium arsenate and the basic arsenate. The third salt, tri-calcium arsenate, but usually called calcium arsenate, is the sale of the patent. The first and second salts are soluble in water and readily decompose, forming arsenic acid which injures plants and foliage. The patent related to a process for the manufacture of the product, free from soluble arsenic or acid salt.

Production of Graphite in 1927

WHILE the total production of graphite in the United States in 1927 was slightly less than that of 1926, its total value increased, according to a statement by the United States Bureau of Mines, Department of Commerce. The following statistics of production were collected in co-operation with the geological surveys of Alabama, Michigan and Texas: The sales of natural graphite by producers in 1927 were 5207 short tons, valued at $232,971, a decrease of 263 tons or 5% in quantity, and an increase of $13,629 or 6% in value, compared with 1926. The decrease in production was in the amorphous variety, the crystalline variety increasing both in quantity and value. The sales of amorphous and crystalline graphite were nearly equally divided, 2595 tons of the former and 2612 tons of the latter being sold or consumed by the producer. This was a decrease of 380 or 13% in the former and and increase of 235,200 lb. (117+ short tons) or 5% in the latter. The value of the amorphous variety decreased $4650 or 11% and the crystalline variety increased in value $18,279 or 10%, compared with 1926. The quantity and value of crystalline graphite in 1927 were the largest since 1920.

The producing states in 1927 were Alabama, California, Michigan, Montana, Nevada, Rhode Island and Texas. Alabama is the leading state in the production of crystalline graphite and reported 66% of the total quantity and 74% of the total value in 1927.

The striking features of the industry in 1927 were the activity in Alabama, the increased production of crystalline graphite there, and the reappearance of California as a producing state after five years of inactivity. The manufacture of artificial graphite in New York decreased considerably, from 21,163,986 lb. in 1926 to 12,257,239 in 1927, or 42%. The imports of graphite in 1927 amounted to 17,452 short tons, valued at $723,923, compared with 16,166 short tons, valued at $921,233 in 1926, an increase of 8% in quantity but a decrease of 21% in value.

Unique Court Decision

EVEN though the blasting of a rock ridge for material to use in the rock crushers for the road work being done for the state of Washington by Meyers and Goulter, near Dayton, Columbia county, shook his house until the plaster fell from the walls and cracks appeared in the cement steps and basement walls, Rolla Lambert cannot collect a cent of damages from the state.

Such is the holding of the memorandum opinion filed by Thurston County Judge John M. Wilson here recently.

The opinion is based on the finding that acts complained of were tortuous, or wrongful, in their nature, and that the state is not liable in damages for the tortuous acts of its agents.—*Tacoma* (Wash.) *Ledger.*

Testing Trip Shows Missouri Farmer's Need for Agricultural Limestone

Demonstration Car Tests More Than Five Hundred Soil Samples

IN northern Missouri there are 11 counties with only one county agricultural agent and seven teachers of vocational agriculture in the whole territory. Throughout this district the only means of obtaining information concerning agricultural limestone available to most of the farmers was through the College of Agriculture of the University of Missouri. Naturally, with such a lack of opportunity to test their soil for acidity, few of the farmers paid any attention to the use of agstone on their land.

On account of this situation, and because there was evidenced a gradually growing interest in agricultural limestone in the territory even under such adverse conditions, the Quincy, Omaha, and Kansas City R. R. (which serves this territory) decided to arrange a soil-testing trip over its line to aid the farmers and show them the value of agstone on the soil. The trip was arranged by Walter B. Remley, agricultural agent for the C. B. & Q. R. R., at St. Louis, who also holds the same position for the Q. O. & K. C. R. R. The co-operation of the Missouri College of Agriculture was enlisted and O. T. Coleman, soils extension specialist for northeastern Missouri, was assigned to make the trip with Mr. Remley.

In arranging a trip of this kind it was necessary that word reach the farmers well before the scheduled arrival of the testing car so that they could arrange to have samples ready for testing. A. A. Jeffrey, editor for the College of Agriculture, sent out publicity about the trip through the Missouri Farms News Service, and Mr. Remley sent out three sets of stories to Q. O. & K. C. agents who gave them to the town papers.

Farmers were urged to bring in soil samples and leave them with the local railway agent. The publicity stated, "No speeches, no exhibits, soil testing only. You don't even have to be present. If you're too busy to

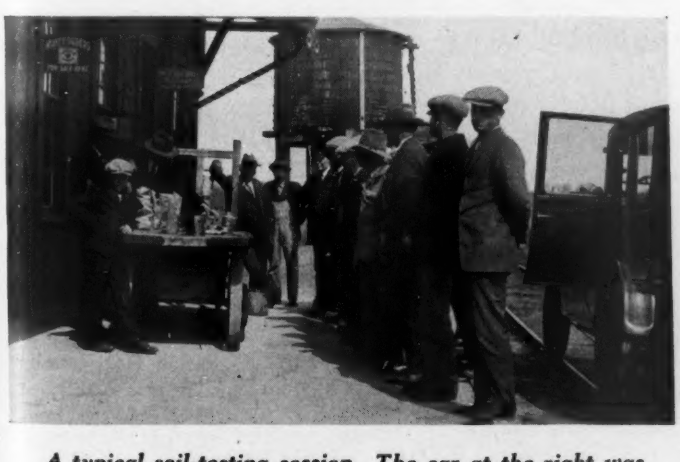
A covered bin prevents wasting the lime, and permits winter hauling

come in, your soil will be tested and the results left with the railroad agent who will give them to you." J. P. Cummings, superintendent of the road at Kansas City, sent out a general letter to the agents instructing them to talk it up among the farmers.

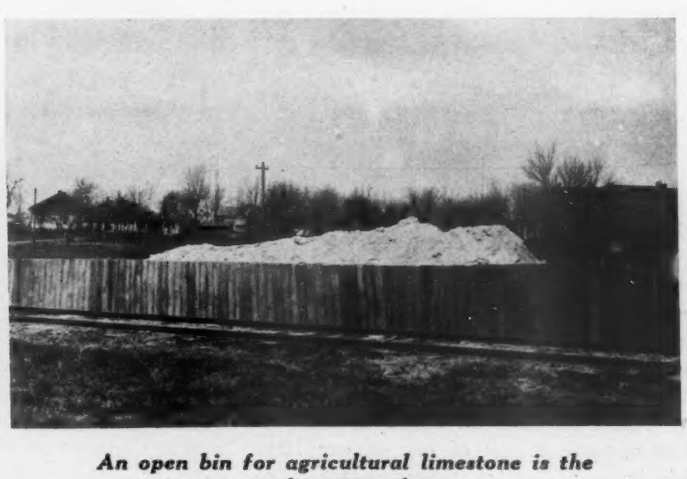
This trip was not planned to provide the big exhibit and demonstration of the "Clover and Prosperity Special" which was arranged by the railroads in the summer of 1927, and was described in the Sept. 3, 1927, issue of ROCK PRODUCTS. The present trip planned to render the farmer the most service with the least fuss, and hence all that was required by Mr. Remley and Mr. Coleman was a Ford motor car equipped with railroad-car wheels for use on the tracks. In this car they covered the whole line and made 32 stops on the way to test soil for the farmers. The trip was made on April 23 to 27.

A total of 529 samples were tested from 8,360 acres belonging to 184 farmers. Practically every sample was sour. The testing demonstrated to others beside the farmers who brought samples, because 429 came to watch the testing. On the "Clover and Prosperity Special," 12 stops were made in this territory and 322 samples of soil were tested from 5217 acres belonging to 192 farmers. Hence 851 soil tests have been made within the past year from 13,577 acres belonging to 376 farmers, through the co-operation of the Q. O. & K. C. R. R. and the State College of Agriculture.

There can be no question that this trip will do much to popularize agricultural limestone in that territory. A concerted effort has been made for more than a year to get as many of the towns as possible to stock lime. Ten Q. O. & K. C. stations now have it stocked and at least three more will have lime on hand for the farmers in the near future. That this work is increasing the use of lime and the growing of more legumes in this territory is attested by the fact that the the Q. O. & K. C. delivered 59 cars of agricultural limestone to its stations in 1927 against 18 in 1926, an increase of 228%.



A typical soil-testing session. The car at the right was used to make the trip



An open bin for agricultural limestone is the most common type

Will Texas Operate Cement Plants?

(An Editorial in "Roads and Streets")

THE Texas legislature is conducting an investigation to determine the feasibility of putting the state into the business of manufacturing portland cement. We suggest that they start with an inquiry into the cost of operating the cement plant that Los Angeles operated during the building of its aqueduct. The plant was offered "very cheap" to the county of Los Angeles, which had just begun to build roads on an extensive scale, but the county supervisors declined the offer. One of the former supervisors informs us that an engineering investigation of the cost of manufacturing cement with the Los Angeles plant showed costs much greater than the market price of cement.

State and federal legislators are rarely men who have had much business experience, and to such men the successful conduct of any business enterprise often seems to be merely a matter of having capital. So they are prone to favor socialistic schemes, such as public operation of cement plants, steamship lines and what not. Only the other day the U. S. Senate refused to declare itself against government operation of a merchant marine, in spite of the fact that our post-war experience along that line has been a heavily losing venture for almost ten years. However, a salient characteristic of many legislators is inability to weigh economic facts even when the data are easily available. If the data are not easily to be had, then they almost never search for the information.

America is the least socialistic of all governments, and its people are far and away the most prosperous. This, we believe, is not a mere coincidence. Our neighbor Canada is much more socialistic, and less prosperous. In that case it cannot be argued that difference in natural resources accounts for difference in prosperity. Canada's steady loss of population to America is excellent evidence of the difference in prosperity. Men naturally tend to seek the best market for their services, and the best market is where general prosperity is greatest.

Coming back from general principles to state ownership of cement plants, how does it happen that cement is so frequently suggested as a thing to be manufactured by a state? Why not go into the business of manufacturing crushed stone? Or asphalt? Or brick? Or lumber? Or pipe? Or steel? Well, if any state does get deep enough in the making of cement, and can keep its unit costs successfully hidden, probably it will not be long before its officials will be urging state manufacture of most of these structural materials.

Why stop there? The state could also make machinery of all kinds. Indeed, not long ago the mayor of one of our large cities was advocating the manufacture of water meters, which is a highly specialized industry, by the city.

Might it not be a good plan to give all our socialistically inclined legislators a free trip to Russia? They could there behold all that America is not, a completely socialized state.

Products Plant Under Way

PLANS are completed for the erection of the gypsum products plant of the United States Phosphoric Products Co. at Tampa, Fla., which was announced in the April 14, 1928, issue of ROCK PRODUCTS.

The new plant will be housed in a steel and concrete building, 80x150 ft. The equipment includes several 1000-ton steel storage bins, electric cranes, rotary dryer, calciner, block machines and bagging equipment. The company, as mentioned in the previous article, has available for the manufacture of gypsum block and gypsum plaster, a large supply of raw material derived as a by-product from the manufacture of triple superphosphate, a fertilizer material, manufactured in the present plant at Tampa.

Herzog Quarry Resumes Work After Rebuilding Plant

OPERATIONS at the Herzog stone quarry, Patterson, Ohio, are now resumed in a portion of the plant, it was announced recently by Bert Herzog, the manager. The work of rebuilding has been going on for some months.

It will be two or three months, it was stated, before the large initial crusher and screening plant will be ready for operation. Two smaller crushers are now in operation, as well as a portion of the screening apparatus.

One hundred men are now employed, 30 of whom are occupied with the construction. *Kenton* (Ohio) *News-Republican.*

Operating Staff of Pyramid Cement Plant Unchanged

THE operating personnel of the Pennsylvania-Dixie Cement Corp.'s plant at Valley Junction, Iowa, remains the same as when the Pyramid Portland Cement Co. of Delaware controlled the plant.

At the plant, H. G. Loeffler is superintendent; C. W. Ellis, purchasing agent; A. C. Tichenlaub, chief chemist; Charles Stotts, general foreman; W. T. Palmer, chief electrician, and George Winn, director of safety.

At the city office in Des Moines, Conrad C. Miller is vice-president and general manager of the plant, George R. Shaw is secretary and Robert P. Mayer is sales manager. —*Valley Junction* (Iowa) *Booster.*

Australians Visit American Cement Plants

TWO Australians, G. H. Limb, managing director of the Victor Plaster Mills Co., Ltd., Victoria, Australia, and H. J. Jennings, chief chemist and sole officer in charge of manufacture in the Australian Cement Co.'s plant at Geelong, Victoria, have been recently visiting American cement plants.

Mr. Jennings is completing a world tour of cement plants. He recently sailed for Australia after an absence of over a year.

Boston Citizens Protest New Gypsum Plant

AN appeal will be taken to the state departments of public health and public safety against the action of city officials in granting a permit for the establishment of a gypsum plant at the Mystic dock, Charlestown, Mass., a suburb of Boston, opposite the naval hospital. This move was decided upon at a recent meeting of residents in the Charlestown municipal building when it was charged that the city is sanctioning the violation of a state law which prohibits the manufacture of gypsum in Boston. The permit was granted by the board of appeal at city hall after Building Commissioner Louis K. Rourke had turned it down.

The Charlestown residents also voted to appear before the board of street commissioners and protest against the granting of a permit to the United States Gypsum Co., the firm involved, to store 2400 gallons of fuel oil on the property.—*Boston* (Mass.) *Herald.*

Residents Protest Proposed Cement Plant

LOS ANGELES, Calif., citizens in the Beverly district, a residential section, are protesting against the proposed building of a portland cement plant in the vicinity. The company's application for an industrial zoning of its land has been approved by the City Planning Commission. —*Los Angeles* (Calif.) *Times.*

Beg Your Pardon!

THE EDITORS have been very properly called to account for a news item on p. 84 of the April 28 issue headed: "Oregon Governor Recommends State Discontinue Buying Cement." The item is quoted from an Olympia, *Washington*, newspaper and quotes *Governor Hartley*. A loyal Oregonian quite naturally disclaims Governor Hartley and reminds us that Olympia is in the state of Washington and Mr. Hartley is the governor of Washington. We knew it; please pardon our slip.

Editorial Comment

Plasticity of Lime

It looks as if Kenneth W. Ray and Frank C. Mathers had at last found the long sought for secret of the *cause* of the plasticity of limes. A brief abstract of their findings is published on another page of this issue. The full treatise, which is a thesis submitted by Mr. Ray for his degree of doctor of philosophy, is too technical and involved to be fully comprehended by any except those well-posted in the very modern sciences of colloidal and physical chemistry.

Briefly, their discovery means that when lime is freshly hydrated a part of the energy set free through the combination of the calcium oxide and the water is transformed into an electrical charge on each particle of hydrate. These electrical charges, being of the same kind, make the particles repel one another; hence the swelling and plasticity of lime putty. This state continues as long as the right amount of water is present. But in the dry hydrate the particles have lost their electrical charges and do not repel each other, and do not make plastic putties when water is added.

The plasticity of certain dry hydrates of dolomitic limes is due to the unhydrated magnesia, which does hydrate when water is added to make putty. Dolomitic lime hydrates which do not make plastic putty have had the magnesia so hard burned that it does not hydrate when water is added to make putty. Similarly, a high calcium hydrate, which is fully hydrated, has no calcium oxide left to hydrate when water is added.

The inference naturally arises that if a high calcium hydrate is not 100% hydrated, but has an appreciable amount of active calcium oxide left in it, it too would make a plastic hydrate. We believe that this is actually the case, and that this is the reason why some high calcium hydrates make fairly plastic putty while others do not—in other words they simply have not been thoroughly hydrated. This also probably accounts for alleged differences in plasticity with the same lime in different types of mechanical hydrators—the hydrator which does the least efficient job of hydrating would make the most plastic hydrate.

Prof. Mathers became interested in lime as a research worker for the National Lime Association. He has taken out a patent on the use of common salt, added to dolomitic lime in the kiln, for the alleged purpose of making a dolomitic lime that will produce a plastic hydrate from any dolomite. The exact function of the salt in the kiln, we believe, is not known. It may be that it simply tempers the heat and prevents overburning the magnesia. The Ohio dolomites contain salt naturally, while no other dolomite studied was found to contain it.

Purposes of Research

A paragraph from the *National Sand and Gravel Bulletin*, concerning research is worth some comment. The *Bulletin* points out that the purpose of research is not to *prove* something which can be turned immediately to partisan benefit but to *learn* something about the subject of research. Research is in fact a two-edged sword, for what one learns may seem to be to his immediate disadvantage rather than to his benefit. But such information is perhaps of greater value than that which merely confirms one's good opinion of his product, as it enables him to adjust his business to coming changes.

Many examples might be taken from the rock products industry but two which will serve come from the molding sand business. It has been tried repeatedly to substitute other materials for sand in making molds for casting iron but with very little success until research recently solved the problem. The new molds, made of iron with special provision for air cooling, are used only for small parts, but naturally their effect must be felt on the molding sand market.

Of perhaps greater effect are the researches on colloidal ferric hydrate which have demonstrated that it is possible to make a high grade synthetic molding sand from cheap materials. Michigan City dune sand, about the cheapest sand in the central states market, was used as a base. Combined with 15% kaolin, containing 0.44% of hydrated iron oxide, it made a sand that passed breaking strength and compression tests satisfactorily. The details may be found in the "Colloidal Symposium Monograph" recently published.

Such research might seriously affect the producer of a sand with a natural bond for which he had a market that he could control. But if he had the facts in advance he could adjust his business to them, by lowering production costs until he could produce sand at so low a figure that synthetic sand could not compete, or improving his product so much that it would be preferred to anything that could be produced synthetically except at too high a cost. And there might be possibilities in other markets into which synthetic sand could not enter on account of freight rates.

All modern industry is full of examples of research against research; one striving for a greater use of a product, the other for a lesser use or a use at a lower price. It is wise then for organizations to investigate the uses of products as deeply as possible not only to get selling points but to insure themselves against loss of markets which the research of others may bring about. Developments in investigation methods and the eagerness of capital for new investment make sure that research in opposing lines will not be overlooked.

Financial News and Comment

RECENT QUOTATIONS ON SECURITIES IN ROCK PRODUCTS CORPORATIONS

Stock	Date	Bid	Asked	Dividend
Allentown P. C. com.[37]	12-30-27	3	7	
Allentown P. C. 1st 6's[37]	12- 5-27	90	92	
Alpha P. C. new com.†	5-21-28	41	44	75c qu. Apr. 14
Alpha P. C. pfd.[2]	5-21-28	117	....	1¾% qu. June 15
Amer. Aggregate 6's, bonds	5-23-28	105	107	
Am. L. & S. 1st 7's[32]	2-24-28	101¾	102½	
American Silica Corp. 6½'s	5-18-28	100	....	
Arundel Corp. new com.	5-22-28	48¼	48⅝	50c qu. Apr. 2
Atlantic Gyp. Prod. (1st 6's & 10 sh. com.)[10]	5-24-28	No market		
Atlas P. C. com.[2]	5-19-28	41	44	50c qu. June 1
Atlas P. C. pfd.	5-21-28	43	....	66⅔c qu. Apr. 2
Beaver P. C. 1st 7's	7- 9-27	100	100	
Bessemer L. & C. Class A[4]	5-21-28	36	36½	75c qu. May 1
Bessemer L. & C. 1st 6½'s[4]	5-21-28	100½	101¼	
Boston S. & G. com.[16]	5-18-28	78	85	$1 qu., $1 x. Jan. 2
Boston S. & G. 7% pfd.[16]	5-18-28	85	90	1¾% qu. Jan. 1
Boston S. & G. 1st pfd.[16]	5-18-28	90	95	2% qu. Jan. 1
Canada Cem. com.	5-22-28	33	....	
Canada Cement pfd.[43]	5-21-28	99¾	100	1.62½ qu. June 30
Canada Cement 5½'s[11]	5-18-28	102	102½	
Canada Cr. St. Corp. 1st 6's[11]	5-18-28	96	99	
Certainteed Prod.	5-22-28	50¾	51	$1 qu. Apr. 1
Chas. Warner com.[16]	5-21-28	35	36½	50c qu. April 10
Chas. Warner pfd.[16]	5-21-28	108	....	1¾% qu. Jan. 26
Cleveland Stone new st'k	5-22-28	73½	77¾	50c qu. June 1, 25c ex. June 1
Consol. Cement 1st 6½'s, A[42]	5-23-28	95	97	
Consol. Cement 6½ notes[24]	5-23-28	94	98	
Consol. Cement pfd.[41]	5-23-28	50	60	
Consumers Rock & Gravel 1st 7's[18]	5-18-28	100	101½	
Coosa P. C. 1st 6's[32]	12-28-27	65	75	
Coplay Cem. Mfg. 1st 6's[40]	5-21-28	90	....	
Coplay Cem. Com.[40]	5-21-28	12½	....	
Coplay Cem. pfd.[40]	5-21-28	72½	....	
Dewey P. C. 1st 6's[30]	5-23-28	100	102	
Dolese & Shepard[7]	5-23-28	159	163	$2 Apr. 1, $1.50 ex. Apr. 1
Edison P. C. com.[30]	5-19-28	50c	....	
Edison P. C. pfd.[30]	5-19-28	1	....	
Edison P. C. bonds[30]	5-19-28	75	....	
Fredonia P. C. 1st 6½'s[32]	12-28-27	97	101	
Giant P. C. com.[25]	5-18-28	30	33	
Giant P. C. pfd.[25]	5-18-28	33	36	3½% Dec. 15
Ideal Cement com.	5-22-28	140	145	$1 qu. Apr. 2
Ideal Cement pfd.[33]‡	5-19-28	112½	113½	$1.75 qu. Apr. 2
Indiana Limestone 6's	5-23-28	97	97¾	
International Cem. com.	5-22-28	70½	71	$1 qu. July 1
International Cem. pfd.*	5-20-28	Redeemed at 110		1¾% qu. Mar. 30
International Cem. bonds 5's	5-23-28	98¼	99	
Kelley Is. L. & T. new st'k	5-22-28	50	53	62½c qu. July 2
Lawrence P. C.[2]	5-21-28	108	112	2% qu.
Lehigh P. C.[2]	5-21-28	50	52	62½c qu. Jan. 1
Lehigh P. C. pfd.	5-22-28	110	112	1¾% qu. Apr. 2
Lyman-Richey 1st 6's, 1931[13]	8-12-27	99½	100	
Lyman-Richey 1st 6's, 1935[13]	8-12-27	97½	99	
Marblehead Lime 1st 7's[14]	5-18-28	100	....	
Marbleh'd Lime 5½'s, notes[14]	5-18-28	98	....	
Mich. L. & C. com.	5-21-28	35	....	
Mich. L. & C. pfd.[6]	5-21-28	24	....	1¾% qu. July 15
Missouri P. C.	5-23-28	47	47¼	50c qu. May 1
Monolith P. C. com.[9]	5-17-28	15¾	16¼	8% ann. Jan. 2
Monolith P. C. pfd.[9]	5-17-28	9½	10	
Monolith P. C. units[9]	5-17-28	34¾	36¼	
National Cement 1st 7's[38]	5- 4-28	96	99	
National Gypsum A com.[35]	5-23-28	28	30	
National Gypsum pfd.[35]	5-23-28	65	....	1¾% qu. Apr. 1
Nazareth Cem.[20]	5-18-28	31	32½	75c qu. Apr. 1
Newaygo P. C.[1]	12-30-27	115	....	
Newaygo P. C. 1st 6½'s[32]	2-11-28	120	....	
New Eng. Lime pfd., A[22]	5-18-28	....	95	
New Eng. Lime pfd., B[22]	5-18-28	97	99	
New Eng. Lime com.[22]	5-18-28	34	38	
New Eng. Lime 1st 6's[14]	5-18-28	98	100	
N. Y. Trap Rock 1st 6's	5-23-28	102½	102¾	
North Amer. Cem. 1st 6½'s	5-23-28	88	89	
North Amer. Cem. units[19]	5-19-28	....	55	2 mo. per. at 7%
North. Amer. Cem. com.[19]	5-19-28	....	11	
North Amer. Cem. pfd.[19]	5-19-28	....	45	$1.75 qu. Aug. 1
North Shore Mat. 1st 5's[15]	5-23-28	100	....	
Northwestern States P. C.[37]	11-21-27	165	170	
Pac. Coast Cem. 6's. A	5- 3-28	97	98½	
Pacific P. C. new com.[5]	5-18-28	....	22	
Pacific P. C.	4- 5-28	76⅜	80	25c mo.
Pacific P. C. pfd.	5-18-28	....	79	1.62½ qu. Apr. 5
Pacific P. C. notes[5]	3-22-28	99	....	3% s.-a. Oct. 15
Pacific P. C. 6's	5-18-28	....	100	
Peerless Egyp'n P. C. com.[21]	5-21-28	2½	3½	
Peerless Egyp'n P. C. pfd.[21]	5-21-28	90	95	1¾% qu. July 1
Peerless Egyp'n P. C. war.[1]	5-21-28	No market		
Penn-Dixie Cem. 1st 6's[29]	5-23-28	100¾	101	
Penn-Dixie Cem. pfd.[28]	5-23-28	95	96	1.75 qu. July 1
Penn-Dixie Cem. com.[28]	5-23-28	28¼	....	50c qu. July 1
Petoskey P. C.	5-23-28	11½	12¼	1½% qu.
Pittsfield L. & S.[31]	10- 8-27	....	100	
Pittsfield L. & S. com.[31]	10- 8-27	....	25	
Riverside P. C.	5-18-28	180	....	50c mo., June 1
Rockland-Rockport Lime 1st pfd.[10]	5-17-28	....	100	3½% s.-a. Feb. 1
Rockland-Rockport Lime 2nd pfd.[10]	5-17-28	....	60	3% s.-a. Feb. 1
Rockland Rockport Lime com.[10]	5-17-28	No market		1½% qu. Nov. 2
Sandusky Cem.	5-22-28	201½	220	$2 qu. Apr. 2
Santa Cruz P. C. bonds	5-18-28	105¾	....	6% annual
Santa Cruz P. C. com.	5-18-28	90	100	$1 qu. Apr. 1
Schumacher Wallboard com.	5-18-28	23½	24	50c May 15
Schumacher Wallboard pfd.	5-18-28	25¾	26	
Southwestern P. C. units[44]	5-18-28	275	300	
Superior P. C., A	5-18-28	47	47½	
Superior P. C., B[20]	5-17-28	33	35	
Trinity P. C. units[37]	5-18-28	152	156	
Trinity P. C. com.[37]	5-18-28	48	....	
U. S. Gypsum com.	5-23-28	91	91½	40c qu. June 30
U. S. Gypsum pfd.	5-23-28	125½	....	1¾% qu. June 30
Universal G. & L. com.[3]	5-23-28	1¾	2¼	
Universal G. & L. pfd.[3]	5-23-28	17	20	1½% Feb. 15
Universal G. & L., V.T.C.	5-23-28	2	3	
Universal G. & L. 1st 6's[3]	5-23-28	....	63	
Upper Hudson Stone 1st 6's, 1951[32]	12-28-27	92	....	
Vulcanite P. C. 1st 7½'s[32]	12- 5-27	105	109	
Whitehall Cem. Mfg. com.[36]	5-21-28	150	....	
Whitehall Cem. Mfg. pfd.[36]	5-21-28	98	....	
Wisconsin L. & C. 1st 6's[15]	5-23-28	100	....	
Wolverine P. C. com.	5-23-28	6½	7	15c qu. May 15
Yosemite P. C., A com.	1- 4-28	6	....	

*Redeemed on May 20 at $110 and accrued dividends. †Holders of record May 4 have the right, until May 24, to purchase new common at $37 a share in the ratio of one share for each five held. ‡If approved at stockholders' meeting June 15, Ideal Cement preferred holders will be offered $1100 5% 15-year convertible debentures in exchange for each $1000 par amount of preferred; preferred not exchanged will be redeemed at $110 and accrued dividends.

[1]Quotations by Watling, Lerchen & Hayes Co., Detroit, Mich. [2]Quotations by Bristol & Willet, New York. [3]Quotations by Rogers, Tracy Co., Chicago. [4]Quotations by Butler, Beading & Co., Youngstown, Ohio. [5]Quotations by Freeman, Smith & Camp Co., San Francisco, Calif. [6]Quotations by Frederic H. Hatch & Co., New York. [7]Quotations by F. M. Zeiler & Co., Chicago, Ill. [8]Quotations by Ralph Schneeloch Co., Portland, Ore. [9]Quotations by A. E. White Co., San Francisco, Calif. [10]Quotations by Lee Higginson & Co., Boston and Chicago. [11]Nesbit, Thomson & Co., Montreal, Canada. [12]E. B. Merritt & Co., Inc., Bridgeport, Conn. [13]Peters Trust Co., Omaha, Neb. [14]Second Ward Securities Co., Milwaukee, Wis. [15]Central Trust Co. of Illinois, Chicago. [16]J. S. Wilson, Jr., Co., Baltimore, Md. [17]Chas. W. Scranton & Co., New Haven, Conn. [18]Dean, Witter & Co., Los Angeles, Calif. [19]Hoit, Rose & Troster, New York. [20]Quotations by Bond & Goodwin & Tucker, Inc., San Francisco. [21]Baker, Simonds & Co., Inc., New York. [22]Pirnie, Simons and Co., Springfield, Mass. [23]Blair & Co., New York and Chicago. [24]A. B. Leach and Co., Inc., Chicago. [25]Richards & Co., Philadelphia, Penn. [26]Hincks Bros. & Co., Bridgeport, Conn. [27]J. G. White and Co., New York. [28]Mitchell-Hutchins Co., Chicago, Ill. [29]National City Co., Chicago, Ill. [30]Chicago Trust Co., Chicago. [31]McIntyre & Co., New York, N. Y. [32]Hepburn & Co., New York. [33]Boettcher & Co., Denver, Colo. [34]Kidder, Peabody & Co., Boston, Mass. [35]Farnum, Winter and Co., Chicago. [36]Hanson and Hanson, New York. [37]S. F. Holzinger & Co., Milwaukee, Wis. [38]McFetrick and Co., Montreal, Que. [39]Tobey and Kirk, New York. [40]Steiner, Rouse and Stroock, New York. [41]Hornblower & Weeks, Chicago, Ill. [42]E. H. Rollins, Chicago, Ill. [43]Jones, Heward & Co., Montreal, Que. [44]Tenney Williams & Co., Inc., Los Angeles, Calif.

INACTIVE ROCK PRODUCTS SECURITIES (Latest Available Quotations)

Stock	Price bid	Price asked
Asbestos Corp. of Amer., 5 sh. pfd., 5 sh. com.[1]	$1 for the lot	....
Atlanta Shope Brick and Tile Co[1]	25c	....
Benedict Stone Corp. (cast-stone), 50 pfd., 390 com.[1]	$400 for the lot	....
Benedict Stone Corp. 1st 7's 1934[8]	....	86
Blue Stone Quarry, 60 sh.[2]	$10¼ for the lot	....
Eastern Brick Corp., 7% cum. pfd.[1]	40c	....
Eastern Brick Corp. (sand lime brick) com.[1]	40c	....
International Portland Cement Co., Ltd., pfd.	30	45
Globe Phosphate Co., $10,000 1st. mtg. bonds, $169.80 per $1000 paid on prin.	$50 for the lot	....
Iroquois S. & G. Co., Ltd., 2 sh. com., 3 sh. pfd.[1]	$12 for the lot	....
Knickerbocker Lime Co.[4]	105	....
Missouri Portland Cement Co., 7% serial bonds	104¾	104¾
Olympic Portland Cement Co.[7]	....	£1⅝
Phosphate Mining Co.[1]	1	....
River Feldspar & Mill'g Co., 50 com., 50 pfd.[1]	$200 for the lot	....
Rockport Granite Co., 1st 6's, 1934	90	....
Simbroco Stone Co.[2]	12	12
Simbroco Stone Co.,[9] 40 sh. pfd., par $50; 40 sh. com., par $10 (40 units)	$2 per unit	....
Southern Phosphate Co.[6]	1¼	....
Standard Gypsum Co., 10 sh. pfd., 5 sh. com.[1]	$35 for the lot	....
Tensas Gravel Co., 180 sh. com.[1]	$1 for the lot	....
Tidewater Portland Cement Co., 3000 sh. com.	$6525 for the lot	....
Vermont Milling Products Co. (slate granules), 22 sh. com. and 12 sh. pfd.[6]	$1 for the lot	....
Wabash Portland Cement Co.[1]	60	100
Winchester Brick Co., pfd., sand lime brick[5]	10c	....

[1]Price obtained at auction by Adrian H. Muller & Sons, New York. [2]Price obtained at auction by R. L. Day and Co., Boston. [3]Price obtained at auction by Weilupp-Bruton and Co., Baltimore, Md. [4]Price obtained at auction by Barnes and Lofland, Philadelphia, on April 4, 1928. [5]Price obtained at auction for lot of 50 shares by R. L. Day and Co., Boston, Mass. [6]Price obtained at auction by Wise, Hobbs and Arnold, Boston, Mass. [7]Neidecker and Co., London, England. [8]Auction sale of $1000, Barnes & Lofland, Philadelphia, March 31, 1928. [9]Price at auction May 2, 1928, by Wise, Hobbs & Arnold, Boston.

Ten Kentucky Crushed Stone Quarries in Consolidation

THE KENTUCKY CONSOLIDATED STONE CO., Louisville, Ky., has been organized to take over 10 crushed-stone operations. E. W. Hays and Co., bankers, Louisville, Ky., are offering $600,000 of 7% cumulative preferred stock in the new company at par value $100. This is offered the public in the form of trust receipts representing one share of preferred stock and one share of common stock voting trust certificate. The total authorized is $1,000,000. The dividends are to be paid quarterly at the rate of 7% per annum on May 1, August 1, November 1 and February 1. The preferred stockholders will participate in liquidation or dissolution at 105 and accrued dividends before any distribution is made on common stock. The preferred stock is redeemable in whole or in part on any dividend date on 90 days' notice at 110 and accrued dividends. The transfer agent and registrar is the National Bank of Kentucky, Louisville.

A. J. Hoffman, president of the Kentucky Consolidated Stone Co., summarizes the salient features of this issue as follows:

Business—The Kentucky Consolidated Stone Co. has been organized under the laws of the State of Maryland to acquire in fee simple, except as to two properties which will be acquired subject to small rent, the physical properties of seven companies operating 10 plants and quarries in the state of Kentucky and producing chiefly crushed stone for ballast, road material and concrete aggregate. These companies produced in 1927 approximately 1,033,000 tons of crushed rock. According to figures obtained from the United States Geological Survey there were produced in 1926 in the state of Kentucky approximately 1,750,000 tons of stone for all purposes. Based on these figures, it is estimated that these companies produced in 1927 approximately 60% of rock crushed in Kentucky for all purposes and approximately 80% of rock crushed for commercial purposes. The location of the plants with respect to railroads, highways, and other users of crushed stone, is such that they can supply the needs of these consumers with short railroad hauls. The plants are also located in territory where it is probable the greatest amount of road building will take place in the immediate future. They are so advantageously located that they can supply the major ballast requirements of the four most important railroads traversing Kentucky.

Richard K. Meade, nationally known chemical and industrial engineer, and consultant for leading quarry and cement companies, who has made a recent report of the properties, states that the stone resources of the quarries to be acquired are practically unlimited.

Property values—Mr. Meade has recently appraised the properties to be acquired at a fair value of $5,000,000. The assets to be acquired by the company thus have a value equivalent to over $650 for each share of preferred stock presently to be outstanding after deducting $1,000,000 first mortgage bonds.

Earnings—The average annual combined net income of the properties to be acquired and operated, for the 3-year period ended December 31, 1927, available for interest, dividends, depreciation and federal income taxes, as certified to by Loomis, Suffern and Fernald, was $221,169.18, and for the year ended December 31, 1927, alone was $301,041.90. Based on contracts already on hand, it is estimated by the management that such earnings for the year 1928 will be approximately $450,000. Based on this estimate, after making allowance for depreciation and deducting interest and sinking fund requirements on the first mortgage bonds, there will be net income of $240,000 available for preferred stock dividends, or over 5½ times such annual dividend requirements.

Sinking fund—So long as any of this preferred stock remains outstanding, the company will in each year, commencing with the year 1929, pay into a sinking fund to be applied to the purchase or redemption of its preferred stock, an amount equal to at least 5% of the maximum par value of preferred stock at any time outstanding.

Management—The active management of the company will be in the hands of men who operated successfully some of the constituent properties in the past.

Mr. Meads also states that all the plants are in good operating condition, and that the quality of the product is established and the railroads and Kentucky Highway Commission express satisfaction with this product.

Purpose of issue—The proceeds from the sale of this preferred stock, together with the $1,000,000 first mortgage 6½% ten-year sinking fund gold bonds, will be used to pay cost of properties acquired, for working capital and other corporate purposes.

Voting trust agreement—A majority of the authorized common stock of the company, upon issue of the same, shall be made subject to a voting trust agreement, extending for a period of five years, the voting trustees to be: A. J. Hoffman, president, Kentucky Consolidated Stone Co., Louisville, Ky.; Dunlap Wakefield, E. W. Hays and Co., brokers, Louisville, Ky.; I. W. Iglehart, vice-president, Baltimore Trust Co., Baltimore, Md.; Monro B. Lanier, Birmingham, Ala., president, Norton Coal Mining Co., Monro-Warrior Coal and Coke Co., Kentucky Consolidated Power and Utilities Co.; H. A. Orrick, Jr., Hambleton and Co., investment bankers, Baltimore, Md., and their successors.

Dunlap Wakefield will be chairman of the board of directors, which will consist of the voting trustees.

Capitalization

	To Be Authorized	To Be Outstanding
First (closed) mortgage 6½% ten-year sinking fund gold bonds	$1,000,000	$1,000,000
7% cumulative preferred stock (par value $100) (this issue)	1,000,000	600,000
Common stock (no par value)	100,000 shs.	100,000 shs.

Properties

The properties to be acquired, with amount of material available, as estimated by Richard K. Meade, are as follows:

	Estimated tons of stone available	Estimated life of available material based on present rate of depletion
American Stone Ballast Co., High Bridge, Jessamine county	5,775,000	41 years
Boggs-Burman Co., Yellow Rock, Lee county	25,000,000	180 years
Gooden, Brown & Co., Upton, Hardin county	14,000,000	140 years
Kentucky River Stone and Sand Co., Tyrone, Anderson Co.	20,000,000	120 years
Lilmay Stone Co., Stephensburg, Hardin county	25,000,000	Indefinitely
W. J. Sparks Co., Mt. Vernon, Rockcastle county	50,000,000	Indefinitely
W. J. Sparks Co., Sparks Quarry, Rockcastle county	10,000,000	100 years
W. J. Sparks Co., Mullins, Rockcastle county	2,500,000	Indefinitely
		New property available for additional supply
W. J. Sparks Co., Russellville, Logan county	20,000,000	Indefinitely
		Can be doubled with additional stripping
Webster Stone Co., Irvington, Breckenridge county	7,000,000	100 years

Penn.-Dixie Cement 1927 Financial Statement

THE PENNSYLVANIA-DIXIE CEMENT CORP., New York City, reports its financial condition on December 31, 1927, as follows:

RESULTS FOR THE YEAR ENDING DECEMBER 31, 1927

Net sales	$12,118,114
Manufacturing cost of sales (exclusive of depreciation and depletion) and all other expenses of operation, less miscellaneous income	7,835,252
Provision for depreciation and depletion	1,260,622
Interest charges	747,682
Provision for federal income taxes	307,066
Net profit for the year	$1,967,494
Surplus balance at January 1	2,790,979
Adjustments	Dr. 51,772
Total surplus	$4,706,700
Preferred dividends	910,000
Common dividends ($2.60)	1,040,000
Special reserve for property betterments and improvements	500,000
Surplus at December 31, as per balance sheets	$2,256,700
Earnings per share on 400,000 shares common stock (no par)	$2.64

Ideal Cement to Vote on Changing Preferred Stock

THE directors of the Ideal Cement Co., Denver, Colo., have called a special stockholders' meeting for June 15 to vote on the recapitalization of the company. The plan provides for issuing $8,500,000 in 15-year 5% convertible debentures callable at 105 in exchange for the outstanding preferred stock at the rate of $1,100 in debentures for each $1,000 of preferred stock and calling for redemption at $110 a share and accrued dividends any preferred stock not so exchanged.

Cement Company Comparisons

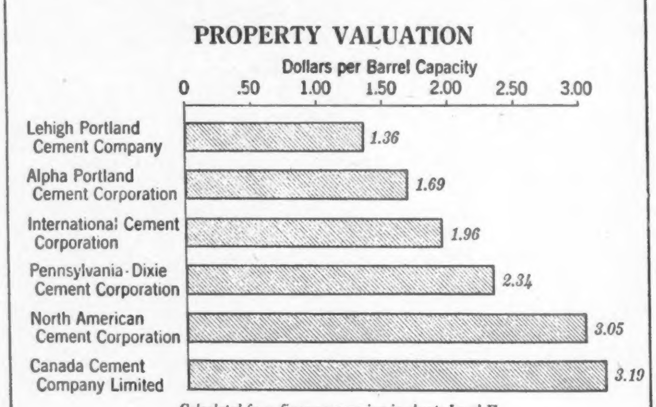
FRANK H. CREHORE AND CO., bankers, New York City, have issued a circular on portland cement industrial securities, from which the accompanying charts are reproduced.

Six companies are included in the comparison: International Cement Corp., Alpha Portland Cement Corp., Lehigh Portland Cement Co., Canada Cement Co., Ltd., Pennsylvania-Dixie Cement Corp. and North American Cement Corp. The last two recently have arranged a consolidation. The Atlas Portland and Universal Portland, two of the most important, do not publish regular financial statements and are not included.

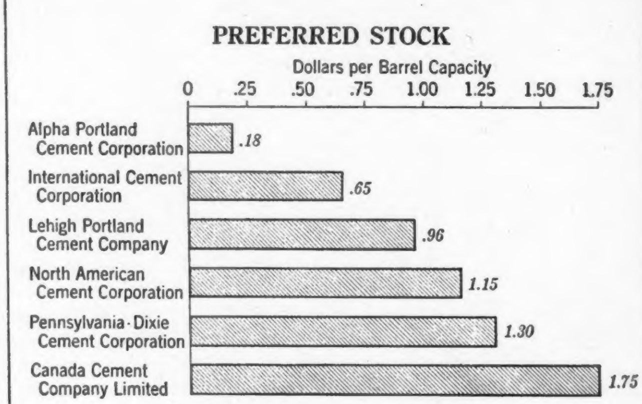
Among the interesting charts are several picturing comparative figures in "dollars per barrel capacity." Capacity is regarded as a fair denominator, inasmuch as data on shipments are kept more or less confidential. The trade figures a plant should be worth at least $2.50 a barrel capacity.

The comparison shows Lehigh's property valued at $1.36 a barrel capacity, Alpha at $1.69, International at $1.96, Pennsylvania-Dixie at $2.34, North American at $3.05 and Canada at $3.19.

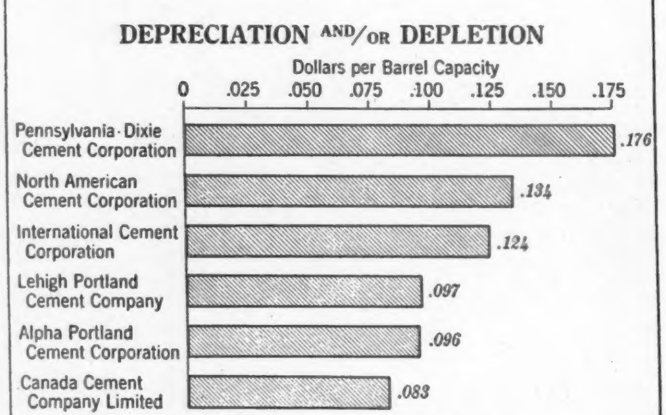
The foregoing data are from an article by



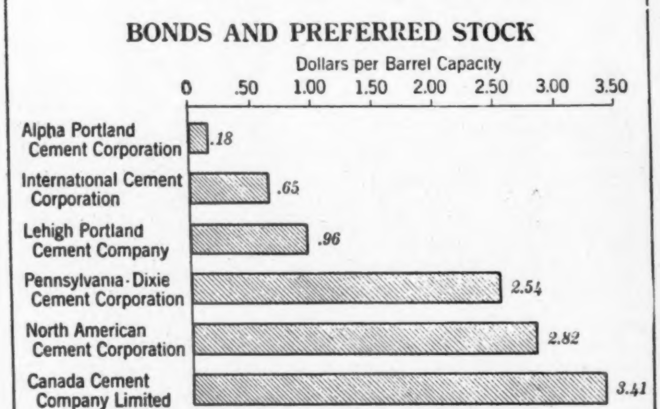
Calculated from figures appearing in charts I and II



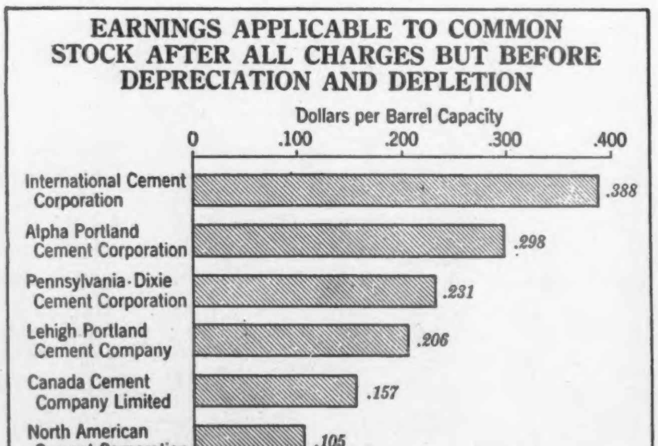
Calculated from figures appearing in charts I and II



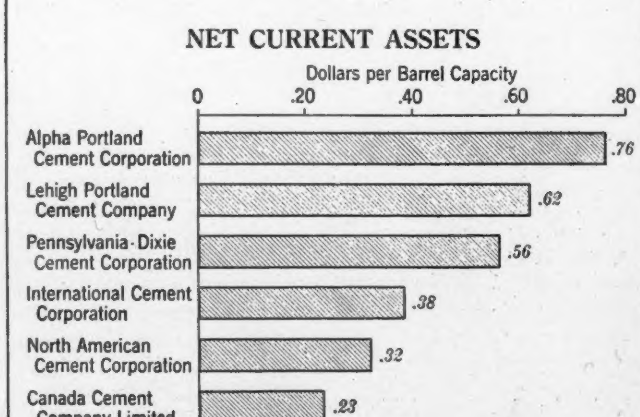
Calculated from figures appearing in charts I and II



Calculated from figures appearing in charts I and II



Calculated from figures appearing in charts I and II

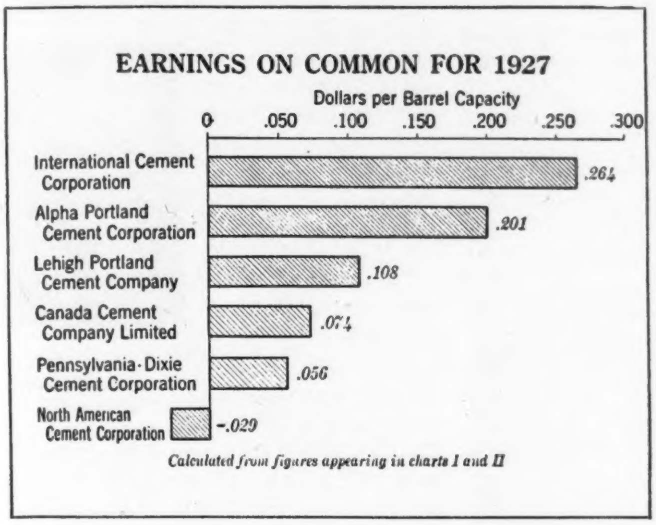


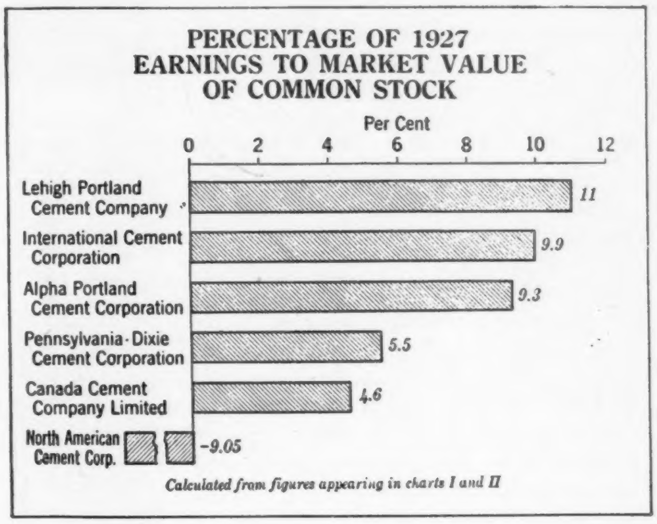
Calculated from figures appearing in charts I and II

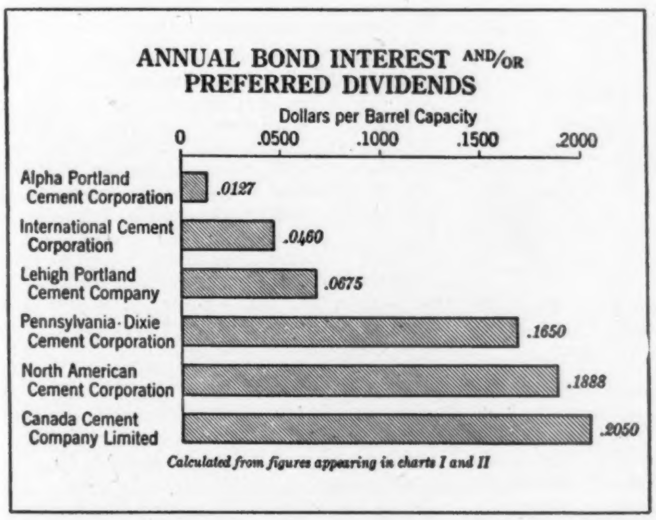
William Russell White in the *New York Evening Post*. Mr. White predicts a new high record for production of portland cement in 1928. He states: "Special concessions granted by some producers last year, together with fear of foreign competition, served to keep down profits to some extent, although in general manufacturers reported a fairly satisfactory year. Production approximated 172,000,000 bbl., and it is expected this year's output will reach 190,000,000 in view of the largest programs for building construction and new roads. Although registration of motor cars has increased 1066% from 1914 to 1925 and cement-built roads have increased in the same period 560%, total road mileage has gained only 22% in comparison.

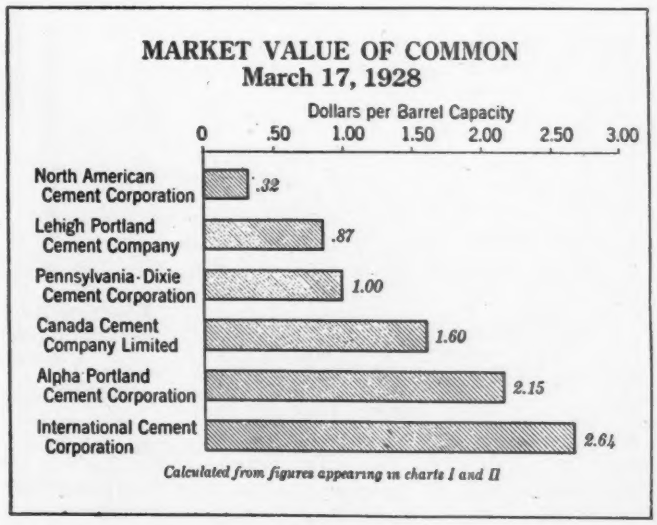
Recent Dividends Announced

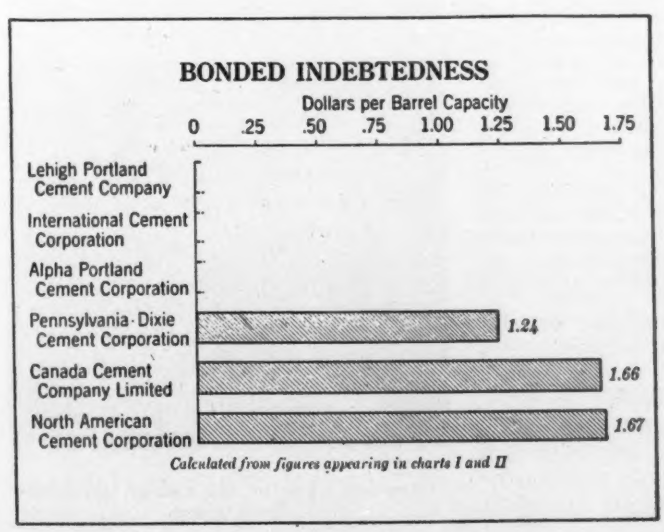
Atlas P. C. com. (quar.)..............50c, June 1
Canada Cement pfd. (quar.)..$1.62½, June 30
Cleveland Stone (extra)...............25c, June 1
International Cement (quar.).........$1, July 1
Kelly Isl. L. & T. (quar.)..........62½c, July 2
Penn-Dixie com. (quar.)...............50c, July 1
Penn-Dixie pfd. (quar.)..............$1.75, July 1
Riverside P. C. com. (mo.)............50c, June 1

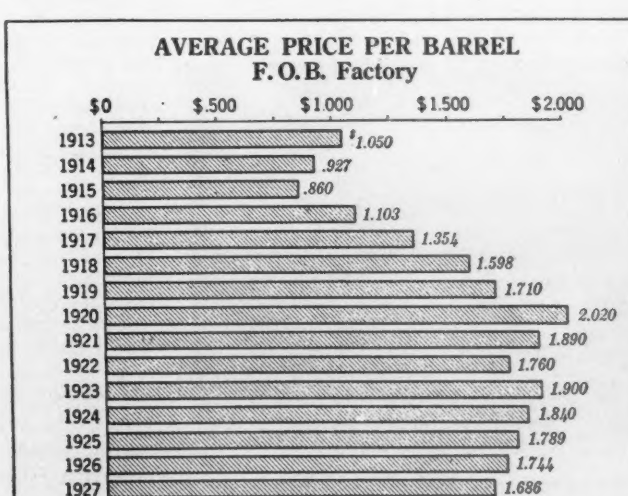












Cement Mills Again Unite in June Safety Drive

Entire Industry Making Every Effort to Operate a Month Without Mishap

PERHAPS the greatest feature event of the year in the cement mills, from the standpoint of worthwhile results as well as the number of people interested, is the June "No-Accident" drive, which has now come to be regarded as regularly recurring institutions.

In June, 1925, such a campaign resulted in reducing accidents to a total of 92, as against the monthly average of 217 for that year. In June, 1927, a similar effort produced a drop in the number of lost time mishaps to 56, as against a monthly average of 114 for that year. During June, 1926, when no special campaign was held, there were 204 lost time accidents, several more than during any other month of the year.

These were the facts which led the committee on accident prevention and insurance of the Portland Cement Association to declare unanimously for a June campaign in 1928 and throughout every mill and quarry in the industry active preparations for the drive are now under way.

Executives Lead

The campaign for a perfect safety record in the cement plants during June really started on May 17 when the secretary of the committee mailed a letter to the active executive of every cement company in the membership of the Portland Cement Association asking these leaders to personally enroll their companies and commit themselves to the successful prosecution of the project. The reply received from the executives is probably without parallel as regards speed and completeness of the response. On Tuesday, May 20, there was on file in the offices of the Portland Cement Association in Chicago signed enrollments bearing the endorsement of one-third of the cement executives of America—every one eager to aid. With two or three exceptions all other company leaders signed up within the following week.

The new flag, a gold cross on a green ground, flying at mills which operated without accident in 1927

EXECUTIVE ENROLLMENT

Our company is fully determined to eliminate industrial accidents and gladly commits itself to the support of the June, 1928, No-Accident Campaign of the Portland Cement Association.

In so doing we call upon every unit of our works and request every employe of our operating organization to enroll wholeheartedly in the campaign to make June a real "no-accident" month throughout our industry. Past experience leads us to believe that, with the earnest co-operation of every workman, our company will be able to operate during the entire month of June without accident.

We have no hesitancy in promising full support. Likewise, we extend the assurance that our operating departments down to the last man are ready to pledge their loyal and enthusiastic help in making this campaign a complete success.

(Dated and signed by manager or other executive.)

Enrollment of the executives was closely followed by that of the works managers, general superintendents, superintendents, foremen and department heads, so that practically every man in authority, throughout the operating and construction departments, has definitely committed himself to making accident prevention his chief business during June. Never before have the mill superintendents and foremen been asked so urgently to teach safety by precept and example. Foremen and mill department heads in particular have been asked to assume a greater share of the responsibility for the safety of the workmen. They have been shown that the road to opportunity for them lies in assuming and discharging more responsibility, particularly in safeguarding their men, thereby becoming broader and more capable.

F. E. Tyler, Dewey Portland Cement Co.

The Green Document

One of the most important features of the campaign is a statement referred to as the "Green Document," which is being offered for signature to every one of the 2400 foremen and department heads in the industry. So far as known it is without a parallel not only in safety literature but in the entire field of industrial relationship. The text of the document is as follows:

"This is to certify that within the past 48 hours I have made a detailed personal inspection of the department under my charge, including the general premises, buildings, machinery, electrical and mechanical devices, the transmission, cables, conveyors, railroad and other means of transportation, including automobiles and trucks; tools, material in use and in storage, objects in storage, waste material, powder magazines, floor, lockers, employes' personal property, stairways, handrails, windows, lighting equipment, fire and blasting alarms, protective apparatus and first aid facilities, and that, with the exception of such conditions as I have specifically noted on the accompanying report, the entire premises and equipment of my department were found to be in safe operating condition.

"I promise to repeat the above inspection daily during the month of June, 1928, personally, or to have it repeated by an assistant for whose intelligence and thoroughness I am willing to vouch.

An effective appeal at Lehigh Birmingham plant

Crossing signs at the Lehigh Birmingham plant

"Every employe working under my supervision is considered by me to be in good health, in full possession of mental and physical faculties (except as noted in attached report) and capable of completing his usual occupation during June with accident.

"It is my belief, therefore, that my de-

1928 JUNE NO-ACCIDENT CAMPAIGN PORTLAND CEMENT ASSOCIATION 1928

SAFETY PLEDGE

I hereby promise and pledge my support to the June No-Accident Campaign and will do everything in my power to prevent injury to myself or to others, thereby helping to keep our safety flag flying.

Signed ____________________

Check No. __________

This portion to be signed and returned to the plant superintendent.

1928 SAFETY CARD

WORKMAN TO RETAIN THIS

This is to remind me of my pledge to work safely myself and to prevent injury to others. During June I will make a special effort to cultivate safety habits.

I HAVE PLEDGED MYSELF TO HELP KEEP OUR SAFETY FLAG FLYING

Employe's pledge card

partment is in proper condition, as to both physical equipment and personnel, to proceed with the June No-Accident Campaign."

This is dated and signed, the title and department being added to the name.

If the foreman believes that his department is in proper condition to operate throughout June without mishap he merely signs the document and hands it personally to his superintendent. If he finds dangerous equipment or men in his department he signs the document and attaches to it his confidential reports covering the hazards he has found. The foreman presents these to the superintendent, who is then in a position to issue warnings or take such other steps as may be necessary to abate the danger. It is felt that the mill whose department heads sign this statement and perform the daily inspections prescribed cannot fail.

New Flag Adopted

The official flag of the campaign, containing a gold cross on a green background, was officially dedicated on Saturday afternoon, May 12, at each of the 10 mills which operated during all of 1927 without accident. After appropriate words of dedication the new flag was hoisted to a position on the pole under the national flag, flying until sundown that day.

On May 15 the new flag was officially received at each of the 150 other plants in the campaign. Until June 1 these flags will remain on exhibition locally. At sunrise June 1 the flag will be raised to the proper position on the plant flag poles, to remain until it wears out or the plant has a lost time accident. Should an accident occur during June the flag must be returned to the Portland Cement Association with full explanation which will be used in warning others.

Repeating a successful feature of last year's campaign, practically every plant in the industry is preparing to hold one or more mass meetings on May 31, at which time it is expected that over 40,000 workmen will sign the individual pledge cards which have been provided. The National Safety Council, United States, and various state departments of labor, U. S. Bureau of Mines and a number of other important organizations are co-operating heartily.

John J. Kelly, Marquette Cement Mfg. Co.

Sign at Penn-Dixie No. 3 plant, Richard City, Ala.

[F. E. Tyler and John J. Kelly, whose pictures appear with this article, are prominently identified with the present safety campaign. Mr. Tyler was chairman of the Kansas City meeting held April 24, which was reported in the May 12 issue. Mr. Kelly presided at the LaSalle, Ill., meeting which was held April 19 and was also reported in the May 12 issue.—Editor.]

Comment on Victor J. Azbe's Articles by French Engineer

SIR: Regarding Mr. Azbe's trip through Germany and England, which has supplied articles for Nos. 2, 4 and 6 of your estimable journal: It is quite certain that kilns with mixed firing of limestone and fuel are much less costly to build and require less fuel per ton of lime produced daily.

The figures for fuel ratios indicated by Alfred P. Searle (ROCK PRODUCTS, March 17, 1928, pp. 83, 84) are undoubtedly reached; sometimes the fuel consumption is even lower than the figures quoted, in kilns of strictly up-to-date design.

At present we are building a kiln in the vicinity of Marseilles of a daily capacity of 50 tons per 24 hours or of 25 tons reduced capacity, when operating 10 out of 24 hours. The limestone is assumed to contain 98% $CaCO_3$, and the guaranted fuel consumption is 180 kg. anthracite or coke per 1000 kg. lime (18%).

Another plant producing a moderately hydraulic lime operates an identical kiln and has a consumption of 75 kg. coke or anthracite per 1000 kg. lime.

We could cite other examples, obtained by simple changes of old kilns, where economy of fuel and daily production conform to the efficiency data of latest kilns.

It is, therefore, correct to state that mixed-feed kilns, receiving a charge of alternate layers of limestone and fuel, are more advantagous than kilns burning the charge of limestone separately from the fuel, such as gas kilns or kilns in which the flames are admitted laterally in the burning zone.

There is, however, the disadvantage of contamination of the lime by the impurities of the fuel, which, in most cases where lime is used, is of minor importance. Instances where such contamination by a small percentage of impurities appears to be a serious matter are rare. When such requirements have to be met, one must ncessarily make use of the gas kilns or a lateral furnace-fired kiln.

This is just what we are at present lacking. We would prefer to place in operation gas kilns already tested, rather than to fabricate the units of such kilns, of which we have made a study and have furnished a number. This is the very reason why, through your medium, we were seeking to reach American companies that would be interested.

We have at present a demand for a plant of 200 to 240 tons of pure lime daily capacity. We submitted a bid for a mixed-feed kiln, yet find it of interest to submit at the same time a bid for a gas kiln, as it is desired to obtain very pure lime.

We have another case where commercial demand would impose the construction of a mixed-feed kiln of 50 tons and of a gas kiln of 20 tons, in accordance with the destination of the products.

In the latter case preference may even be given to three gas kilns to reach a capacity of 60 tons.

We are greatly interested in following the series of articles published by Mr. Azbe. We might be in a position to complete his discussion with material that might be lacking concerning the lime kilns of France.

J. DUCHEZ PERE & FILS.
(Signed) DUCHEZ.

Albi France, April 6, 1928.

Great Lakes Portland to Build Storage in Cleveland

THE Great Lakes Portland Cement Co. of Buffalo will locate a $500,000 storage plant at Sycamore and Riverbed streets in the flats, Cleveland, Ohio.

Although no definite plans have been announced, it is estimated the silos to be erected will store 150,000 tons. The cement will be shipped by boat from Buffalo, where the company has an immense manufacturing plant. No manufacturing will be carried on here, at least in the immediate future.—*Cleveland* (Ohio) *News.*

Cement Plants Dedicate Safety Trophies

ON Wednesday afternoon, May 9, nearly 2000 people, including leading officials of the Alpha Portland Cement Co., Department of Labor and Industry of the state of Ohio and city of Ironton, prominent industrialists and clergymen, as well as employes and their families, gathered at the Ironton mill of the Alpha company to dedicate the Portland Cement Association trophy. The celebration was the first of a series planned in the cement industry to mark the unveiling of the 10 safety trophies won by cement mills for operating during 1927 without an accident causing loss of time.

Ironton Dedicates Trophy

The Ironton trophy, a handsome cast stone monument weighing 16,000 lb., stands on a great mound overlooking the entrance to the plant, easily visible from the main highway. The trophy was made by the Benedict Stone Corp. in its Chicago plant from sculptured models made at the Art Institute of Chicago. It is of hand tooled concrete, commercially referred to as "cast stone."

F. C. Brownstead

Gabriel S. Brown, president of the Alpha Portland Cement Co. and also president of the Portland Cement Association, made the principal address. He was accompanied by F. C. McKelvy, vice-president and operating head; J. H. Barbazette, operating manager; F. C. Brownstead, superintendent of the Ironton plant, and others. The Ironton plant was in spotless condition for the public inspection which followed the dedication, the mill safety committee and special groups of the workmen having taken over and accomplished the entire task of putting the entire property in the "pink" of condition. Much favorable comment regarding this mill is going the rounds in the Buckeye state at present.

Bonner Springs Celebrates June 2.

Invitations are out for the celebration in connection with the unveiling of the 1927 safety trophy at the Bonner Springs plant of the Kansas Portland Cement Co. on Saturday afternoon, June 2. It is expected that persons prominent in the cement industry throughout the Sunflower state, which has figured in the history of cement progress for so many years, will travel to Bonner Springs for the event. Arrangements are being made by Louis J. Wheeler, superintendent of the company, who represents the second generation of Kansas cement men. Mr. Wheeler is the son of James A. Wheeler, one of the Kansas pioneers, who is now vice-president of the Texas Portland Cement Co.

William Moeller of Dallas, Texas, who is general superintendent of the Kansas company and has been a prominent member of the committee on accident prevention of the Portland Cement Association for many years, will be in Bonner Springs for the occasion. High officials of the International Cement Corp. of New York, of which the Kansas is a subsidiary, are also expected.

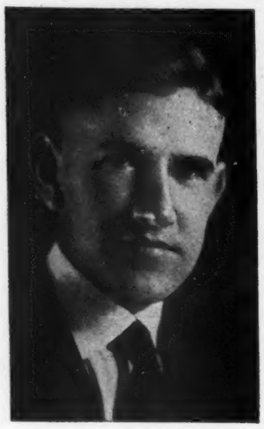
Win Certificates

Superintendent Robert Parsons of the Pittsburgh Plate Glass Co.'s cement plant at Zanesville, Ohio, and Superintendent R. S. Vance of the Clinchfield (Ga.) plant of the Pennsylvania-Dixie Cement Corp. have just announced the award to their respective plants of the Portland Cement Association's certificate of merit for 365 days' continuous operation without accident. The actual awards were made at the spring meeting of the association in New York on May 23. The total number of these awards since January 1, 1928, has now reached 14.

Cement Manufacturers' Safety Campaign Producing Results

OUT of a total of 151 cement mills and quarries in the United States and Canada, 69 finished the first quarter of 1928 without a lost time accident or fatality. These 69 plants form the basic membership of the Portland Cement Association's Trophy Club. To the mills going the entire year free from accident the association awards an eight-ton concrete sculptured monument, modeled by the Art Institute of Chicago.

Twenty-nine more mills operated during the first quarter of 1928 free from accidents than during a similar period in 1927. On March 31, 1927, only 40 mills had completed three months minus accidents and were members of the Trophy Club. "This remarkable showing in safety work points the way to even a better record in 1928 than we had in 1927," says W. M. Kinney, general manager of the association. "Last year 10 mills went through the year without accident and if the present ratio is maintained for the next nine months we may well expect 18 or 19 mills to eliminate mishaps and fatalities this year."

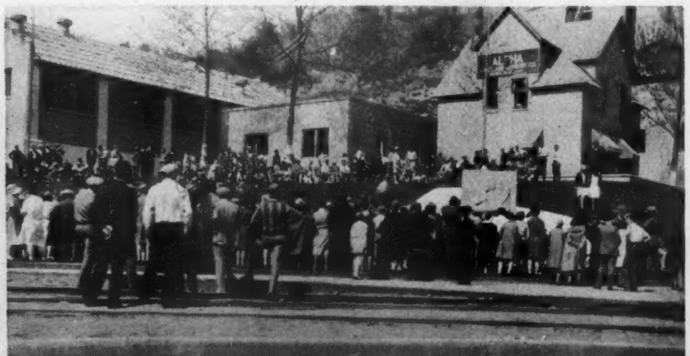


Louis J. Wheeler

During the first quarter of 1927 the cement industry suffered 395 lost time accidents and nine fatalities. The first three months of 1928 recorded 292 lost time accidents and eight fatalities. Lost time accidents decreased 26% in the first quarter of 1928 over the similar period of 1927.

Comparing the first three months of 1928 with the first three months of 1926 shows a decrease of 271 accidents or 46%. During this time the number of mills reporting increased over 21%.

Unveiling the safety trophy at the Ironton plant of the Alpha Portland Cement Co.



A portion of gathering which was present at the dedication of the trophy at Ironton

New Rock Plant for Northern California

THE JOHNSON ROCK CO., Chico, Calif., has recently completed the construction of a modern rock plant near Chico where a practically unlimited supply of high test material has been located by the owner and operator, J. E. Johnston, of Chico. It is so equipped and situated that all types and sizes of materials can be furnished—crushed rock, gravel and sand.

Special auxiliary plants are under construction on the site for the manufacture of cementing road rock and oiled rock surfacing, which is to be mixed in conformance with California state highway specifications, designed to meet an increasing demand for an economical, smooth and dustless covering for minor roads.

The total cost of this plant will be approximately $250,000. The plant is designed for a capacity daily output of 2000 tons.—*Chico* (Calif.) *Enterprise.*

State Line Sand and Gravel Co.'s New Plant

THE STATE LINE SAND AND GRAVEL CO., of Lanesboro, Penn., is a subsidiary of the Scranton Slag Co. which has another sand and gravel plant at Falls, Penn., and its slag plant at Scranton. The State Line plant began operations recently and is described in *Good Roads,* the house organ of the Good Roads Machinery Co., which engineered and equipped it:

The bank is excavated by a one-yard Beaumont-LeClair drag line bucket with Flory electric hoist. The small bucket for the capacity of the plant was selected with the idea of speed, lower first cost and maintenance. When the travel for the bucket exceeds 200 ft. it is the purpose to move the feeding hopper and add a conveyor. The hopper is being constructed in a semi-portable manner to facilitate moving, and has a capacity of about 20 tons.

A 36-in. apron feeder, with clutch located under hopper, delivers material in a uniform flow to a 30-in. troughed belt conveyor 114 ft. long, equipped with an automatic hold-back. Material from the 30-in. conveyor is directed by a chute to a 48 in. diameter x 15 ft. long heavy duty gear driven scalping screen with 2¾-in. holes. Material too large passes out the end of the screen to a 60-ton bin with flat bottom. When the bin fills, the gate is opened and the over-size material is directed to a No. 4½ new type Champion crusher. A 14-in. belt elevator 46 ft. long receives the crusher discharge. The crusher and elevator are operated by a separate motor and only run long enough to empty the "oversize bin." If certain sections of the pit or bank run to finer sizes, the crushing plant may be shut down as long as five or six hours at a time.

The crushed material is carried by the elevator to the same chute leading to the screen as employed by the material from the 30-in. conveyor, thus operating under the closed circuit system.

An 18-in. belt conveyor 146 ft. long carries material from a hopper underneath the primary screen to a 48 in. diameter x 26 ft. long heavy duty finishing screen with a 6-ft. scrubber, and an 8-ft. steel jacket with ⅜-in. holes, located on top of the products bin. Water is introduced at this point in the quantities of gallons per minute equal to the capacity of the plant per tons in ten hours; in this case 500 g.p.m. Two Good Roads geared sand boxes, each 14 ft. by 18 in., provide the necessary concrete sand, as well as brick and plaster sand. The bin is 50 ft. long by 20 ft. wide and 38 ft. high, bottomless type, and equipped with pivoted sand type bin gates for the two sizes of sand and long folding gates with counter-weights for the gravel divisions. Five electric motors, with silent chain drive for the scalping screen, provide the necessary power. The whole plant is well provided with platforms and stairways to facilitate the care and operation of the plant, especially as to lubrication.

Program of British Quarry Managers Convention

AT THE ANNUAL CONFERENCE of the Institute of Quarrying to be held at Blackpool, June 4 to 9, 1928, the following papers are to be read:

"Sand and Gravel Washing," by O. Rickof.

"Commercial Silica Sands," by W. J. Rees, B.Sc.

"Silica—Commercial Properties and Markets," by Prof. P. G. H. Boswell.

"Belt Preservation and Maintenance," by James H. Cooke.

"Some Technical Aspects of Lime-burning," by C. Wood, research metallurgist and chemist.

"Kiln Design," by E. L. Johnson.

"Freestone Quarry" (to be arranged by C. H. D. Dawson).

"Modern Blasting Methods" (illustrated by film), by Dr. W. Cullen.

"Cutting Costs in Slate Quarries—Economical Handling of Blocks and Waste," by T. R. Druitt.

"Electric Traction in Quarries," by I. Williams-Ellis.

Limestone to "Sweeten" Slag for Roadbuilding

THE FOLLOWING item is published for the benefit of both limestone and slag producers—without prejudice—in fact without knowledge of what is meant. Possibly some interested party will supply us with the details of "sweetening slag" later. Our columns are open for a discussion!

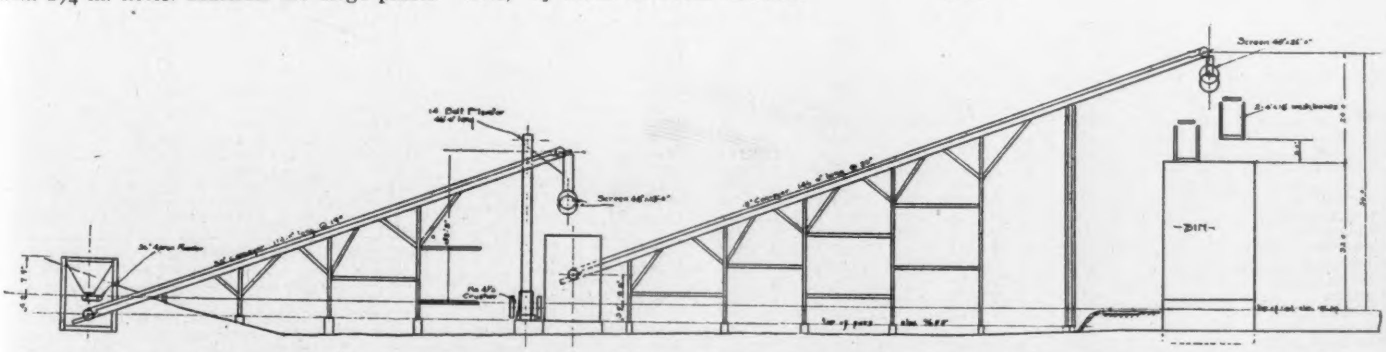
The *Butler* (Penn.) *Eagle* reports:

"At the mine of the Pittsburgh Limestone Co. at Buffalo Creek, between Butler and Kittanning, the production of road limestone has been commenced. This is a departure from the usual production of limestone which is used largely for purposes of fluxing in the mills about Pittsburg, and if it proves satisfactory may lead to a big development along that line.

"Limestone has been largely used on roads for some time past to "sweeten" slag used on the roads in construction work, and it is proposed to try out limestone from the Buffalo Creek mines instead of slag."

Volunteer Portland Begins Production

THE Volunteer Portland Cement Co. at John Sevier near Knoxville, Tenn., began operation at its full capacity of 3000 bbl. per day on May 10. Howell J. Davis, vice-president, said that the plant will employ about 115 men. Cement manufactured at the plant from rock quarried nearby will be shipped throughout the southeastern part of the United States.—*Knoxville* (Tenn.) *Sentinel.*



Layout of the new plant of the State Line Sand and Gravel Co. at Lanesboro, Penn.

Portland Cement Output in April

Stocks Continue to Mount; Shipments 7.3% Less than April, 1927

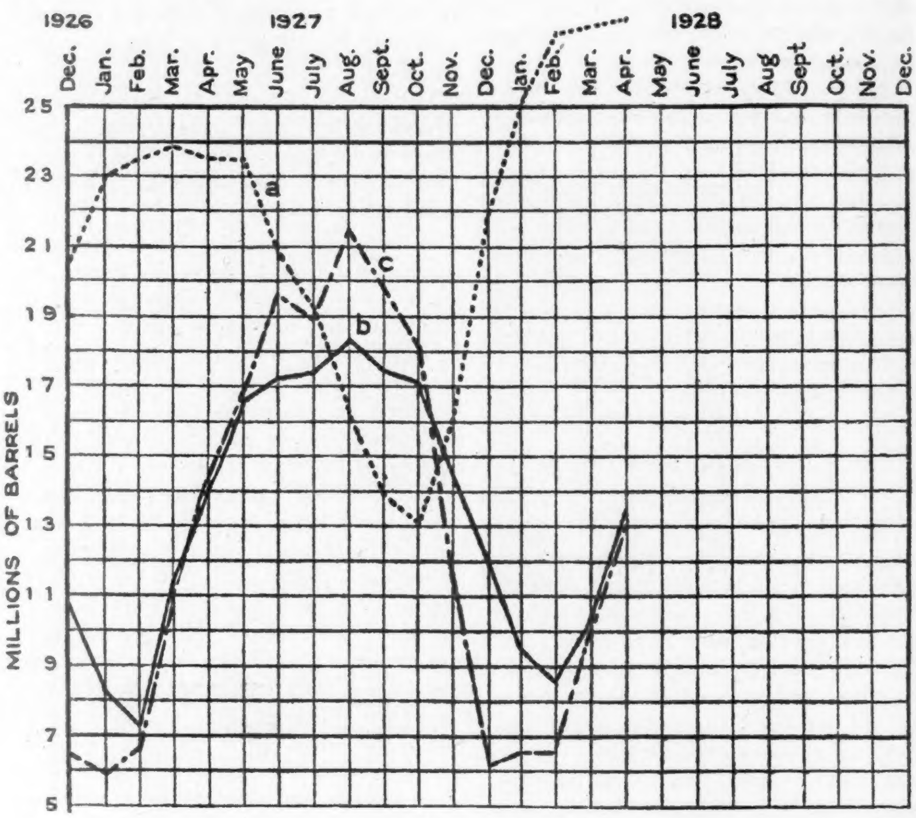
THE PORTLAND CEMENT INDUSTRY in April, 1928, produced 13,468,000 bbl., shipped 13,307,000 bbl. from the mills and had in stock at the end of the month 27,605,000 bbl., according to the United States Bureau of Mines, Department of Commerce. The production of portland cement in April, 1928, showed a decrease of 4.1% and shipments a decrease of 7.3% as compared with April, 1927. Portland cement stocks at the mills were 16.7% higher than a year ago. The total production from January to April, 1928, inclusive, amounts to 42,256,000 bbl. compared with 41,133,000 bbl. in the same period of 1927, and the total shipments from January to April, 1928, inclusive, amounts to 36,546,000 bbl. as compared with 38,149,000 bbl. in the same period of 1927.

The statistics here presented are compiled from reports for April from all manufacturing plants except two for which estimates have been included in lieu of actual returns. They include the output of another new plant, in Maine, which began operations.

The following statement is the relation of 156 plants at the close of April, 1928, and of 143 plants at the close of April, 1927.

RELATION OF PRODUCTION TO CAPACITY

	Apr. 1928 Pct.	Apr. 1927 Pct.	Mar. 1928 Pct.	Feb. 1928 Pct.	Jan. 1928 Pct.
The month	70.0	78.1	51.7	47.5	49.4
12 mo. ended	74.0	76.3	74.6	75.1	74.5



(a) Stocks of finished portland cement at factories; (b) Production of finished portland cement; (c) Shipments of finished portland cement from factories

PRODUCTION AND STOCKS OF CLINKER, BY MONTHS, IN 1927 AND 1928, IN BARRELS

Month	Production 1927	Production 1928	Stock end of month 1927	Stock end of month 1928
January	10,410,000	*11,839,000	9,989,000	9,672,000
February	9,253,000	11,363,000	11,943,000	12,237,000
March	12,397,000	12,501,000	12,997,000	*14,463,000
April	14,246,000	13,844,000	13,335,000	14,978,000
May	15,677,000	....	12,514,000	....
June	15,437,000	....	10,926,000	....
July	15,697,000	....	9,609,000	....
August	16,396,000	....	7,887,000	....
September	15,931,000	....	6,490,000	....
October	16,469,000	....	5,960,000	....
November	14,698,000	....	6,374,000	....
December	13,177,000	....	*7,660,000	....

*Revised.

PORTLAND CEMENT SHIPPED FROM MILLS INTO STATES IN FEBRUARY AND MARCH, 1927 AND 1928, IN BARRELS†

Shipped to—	1927—February	—1928	1927—March	—1928
Alabama	127,020	254,968	141,921	282,379
Alaska	132	928	305	264
Arizona	41,677	72,365	45,602	81,586
Arkansas	59,309	76,288	59,114	101,428
California	649,302	909,617	1,094,778	937,253
Colorado	45,006	33,593	47,912	60,381
Connecticut	58,534	52,401	109,035	113,752
Delaware	13,885	11,304	24,826	19,230
District of Columbia	59,964	55,069	95,396	62,160
Florida	285,604	105,590	290,682	114,798
Georgia	134,787	97,616	169,167	157,171
Hawaii	31,022	26,923	19,615	39,411
Idaho	27,495	11,020	35,047	23,994
Illinois	417,054	401,092	752,148	700,881
Indiana	143,650	102,747	*273,970	232,338
Iowa	55,837	41,520	147,119	149,705
Kansas	107,823	107,291	166,110	194,957
Kentucky	78,183	52,748	*112,435	103.113
Louisiana	122,629	97,484	134,893	115,669
Maine	5,422	10,738	20,132	18,704
Maryland	123,421	66.413	231,780	123,334
Massachusetts	81,457	100.548	193,283	160,730
Michigan	301,666	287,114	*527,829	433,110
Minnesota	61,047	49,334	147,967	128,332
Mississippi	62,783	50,677	75,149	73,937
Missouri	173,365	170,275	287,825	333,221
Montana	9,845	10,578	19,365	27,23[illegible]
Nebraska	39,594	33,967	81,860	88,491
Nevada	3,649	4.524	7,665	7,568
New Hampshire	9.599	18,066	25,391	25,575
New Jersey	279,739	296,641	611,542	505,016
New Mexico	20,957	21,302	32,564	30,606
New York	855,484	768,681	1,511,091	1,237,218
North Carolina	168,720	100,830	235,316	209,006
North Dakota	3,081	2,641	20,429	18,274
Ohio	321,218	298,885	*585,797	540,347
Oklahoma	191,130	203,245	235,301	294,206
Oregon	53,310	74,793	91,820	78,121
Pennsylvania	476,001	404,956	*865,043	657,006
Porto Rico	1,275	0	2,500	1,329
Rhode Island	19,874	18,701	50,746	47,707
South Carolina	47,821	75,677	71,247	119,612
South Dakota	10,170	10,434	31,724	25,694
Tennessee	102,871	109,112	137,431	174,774
Texas	371,525	383,884	481,261	546,960
Utah	15,527	15,131	25,741	35,955
Vermont	4,472	15,902	9,397	14,737
Virginia	92,723	104.674	124,387	173,697
Washington	124,266	128,568	229,012	162,335
West Virginia	64,296	44,944	*97,094	81,273
Wisconsin	100.245	91,829	221,345	148,969
Wyoming	7,754	8,427	10,293	13,571
Unspecified	18,914	22,737	*14,749	57,761
	6,682,134	6,514,792	*11,034,151	10,084,877
Foreign countries	48,866	48,208	65,849	50,123
Total shipped from cement plants	6,731,000	6,563,000	*11,100.000	10,135,000

†Includes estimated distribution of shipments from three plants in February and March, 1928, and in February, 1927; and from five plants in March, 1927.

*Revised.

PRODUCTION, SHIPMENTS AND STOCKS OF FINISHED PORTLAND CEMENT, BY DISTRICTS, IN APRIL, 1927 AND 1928, AND STOCKS IN MARCH, 1928, IN BARRELS

District	Production 1927—Apr.	Production —1928	Shipments 1927—Apr.	Shipments —1928	Stocks at end of month 1927	Stocks at end of month 1928	Stocks at end of March, 1928*
E. Penn., N. J. and Md.	3,640,000	3,084,000	4,163,000	3,303,000	5,154,000	6,463,000	6,682,000
New York and Maine†	898,000	831,000	843,000	850,000	1,624,000	1,847,000	1,866,000
Ohio, W'n Penn. and W. Va.	1,409,000	1,321,000	1,301,000	1,154,000	3,380,000	3,577,000	3,411,000
Michigan	1,056,000	1,056,000	963,000	846,000	2,068,000	2,470,000	2,260,000
Wis., Ill., Ind. and Ky.	1,552,000	1,438,000	1,623,000	1,670,000	3,277,000	3,429,000	3,661,000
Va., Tenn., Ala. Ga., Fla. and La.	1,354,000	1,381,000	1,385,000	1,276,000	1,144,000	2,040,000	1,935,000
E'n Mo., Ia., Minn. and S. Dak.	982,000	1,142,000	977,000	1,154,000	3,231,000	3,901,000	3,912,000
W'n Mo., Nebr., Kan. and Okla.	964,000	906,000	791,000	803,000	1,756,000	1,566,000	1,463,000
Texas	469,000	557,000	491,000	538,000	425,000	468,000	450,000
Colo., Mont. and Utah	210,000	200,000	194,000	217,000	486,000	465,000	482,000
California	1,177,000	1,254,000	1,263,000	1,184,000	629,000	929,000	860,000
Ore. and Wash.	337,000	298,000	356,000	312,000	480,000	450,000	463,000
	14,048,000	13,468,000	14,350,000	13,307,000	23,654,000	27,605,000	27,445,000

PRODUCTION, SHIPMENTS AND STOCKS OF FINISHED PORTLAND CEMENT, BY MONTHS, IN 1927 AND 1928, IN BARRELS

Month	Production 1927	Production 1928	Shipments 1927	Shipments 1928	Stocks at end of month 1927	Stocks at end of month 1928
January	8,258,000	*9,768,000	5,968,000	*6,541,000	22,914,000	25,116,000
February	7,377,000	8,797,000	6,731,000	6,563,000	23,563,000	27,349,000
March	11,450,000	10,223,000	11,100,000	10,135,000	23,922,000	*27,445,000
April	14,048,000	13,468,000	14,350,000	13,307,000	23,354,000	27,605,000
May	16,701,000	....	16,865,000	....	23,503,000	....
June	17.224,000	....	19,761,000	....	20,972,000	....
July	17,408,000	....	18,984,000	....	19,397,000	....
August	18,315,000	....	21,411,000	....	16,292,000	....
September	17,505,000	....	19,828,000	....	13,993,000	....
October	17,174,000	....	18,105,000	....	13,141,000	....
November	14,449,000	....	11,619,000	....	16,022,000	....
December	11,999,000	....	6,200,000	....	*21,924,000	....
	171,908,000	....	170,922,000	....	....	....

PRODUCTION AND STOCKS OF CLINKER (UNGROUND CEMENT), BY DISTRICTS, IN APRIL, 1927 AND 1928, IN BARRELS

District	1927—Production	—1928	Stocks at end of month 1927	Stocks at end of month 1928
Eastern Penn., N. J., and Maryland	3,452,000	3,067,000	1,996,000	1,974,000
New York and Maine†	895,000	924,000	580,000	1,125,000
Ohio, Western Pennsylvania and West Virginia	1,423,000	1,411,000	1,634,000	1,998,000
Michigan	1,133,000	1,048,000	1,850,000	1,881,000
Wisconsin, Illinois, Indiana and Kentucky	1,710,000	1,491,000	1,944,000	2,515,000
Virginia, Tenn., Ala., Ga., Fla., and La.	1,416,000	1,397,000	897,000	1,029,000
Eastern Missouri, Iowa, Minnesota and S. Dak.	979,000	1,198,000	942,000	1,162,000
Western Missouri, Nebraska, Kansas, Oklahoma	947,000	998,000	669,000	657,000
Texas	476,000	556,000	138,000	159,000
Colorado, Montana and Utah	193,000	206,000	846,000	447,000
California	1,262,000	1,187,000	1,233,000	1,349,000
Oregon and Washington	360,000	361,000	606,000	682,000
	14,246,000	13,844,000	13,335,000	14,978,000

†Maine began producing and shipping in April, 1928.

EXPORTS OF HYDRAULIC CEMENT BY COUNTRIES IN MARCH, 1928

Exported to—	Barrels	Value
Canada	2,205	$ 10,047
Central America	18,318	57,372
Cuba	6,657	19,446
Other West Indies	8,347	18,428
Mexico	7,916	25,311
South America	25,157	97,948
Other countries	6,382	37,163
	74,983	$265,719

IMPORTS OF HYDRAULIC CEMENT BY COUNTRIES, AND BY DISTRICTS, IN MARCH, 1928

Imported from	District into which imported	Barrels	Value
Belgium	Galveston	16,300	$ 20,459
	Massachusetts	84,431	126,040
	New York	11,085	13,946
	North Carolina	40,000	49,242
	Oregon	6,000	7,238
	Rhode Island	21,828	28,539
	South Carolina	4,362	5,179
	Washington	6,000	8,665
	Total	190,006	$259,308
Canada	St. Lawrence	500	$ 940
Denmark	Porto Rico	33,874	$ 52,697
France	New York	1,290	$ 4,179
Germany	Massachusetts	250	$ 417
Hungary	Philadelphia	10	$ 31
United K'd'm	New York	9,999	$ 12,494
	Ohio	1	8
	Total	10,000	$ 12,502
	Grand total	235,930	$330,074

DOMESTIC HYDRAULIC CEMENT SHIPPED TO ALASKA, HAWAII AND PORTO RICO, IN MARCH, 1928

	Barrels	Value
Alaska	1,296	$ 3,967
Hawaii	23,825	54,654
Porto Rico	2,595	5,845
	27,716	$64,466

Commonwealth Cement Plans Vermont Plant

THE COMMONWEALTH PORTLAND CEMENT CORP., North Pownal, Vt., has tentative plans for a cement plant of 1,150,000-bbl. capacity. Bids for plant, machinery and machine tools are to be received by Kennedy-Van Saun Manufacturing and Engineering Corp., 2 Park Avenue Bldg., New York City, according to a recent announcement.

This is, apparently, the project being promoted by L. L. Griffiths, noted in the review of the portland cement industry, ROCK PRODUCTS, December 24, 1927, p. 109, as a Delaware corporation with a project for a plant at North Adams, Mass. North Pownal, Vt., is a short distance north of the Massachusetts-Vermont state boundary and is in the same limestone formation. Lime plants have been operating there for many years.

Alabama Makes Big Cement Purchase

THE State Board of Administration of Alabama recently purchased approximately 300,000 bbl. of cement for the state highway department. The cement was purchased from the six cement concerns operating in Alabama and was prorated among them on the basis of the amount of taxes paid by them to the state government. The only difference in the prices quoted by the companies bidding, it is stated, was the difference arising from freight rates from points of origin to points of destination.—*Montgomery* (Ala.) *Advertiser.*

Milwaukee Building Supply Dealers to Co-operate on Purchases

SIXTEEN Milwaukee dealers in building materials have organized the Supply Dealers' Co-operative Corp. for the purpose of group buying. The incorporators are Robert Degentesh, Arthur Marggraff, Chester Van Roo, Henry Cook and John Druecker. Maurice A. McCabe will be counsel and E. S. Salmon manager.

It is anticipated that facilities of the organization will be extended so as to enable dealers throughout Wisconsin to take advantage of the benefits derived from large volume purchases.—*Milwaukee* (Wis.) *Journal.*

[The Wisconsin law is unique in this respect. A law a few years ago legalizing farmer co-operatives was held by the courts to extend to any other business. The Wisconsin Co-operative Agricultural Limestone Association (described in ROCK PRODUCTS, May 14, 1927) operates under this law.—The Editor.]

EXPORTS AND IMPORTS OF HYDRAULIC CEMENT, BY MONTHS, IN 1927 AND 1928

Month	1927—Exports Barrels	Value	—1928 Barrels	Value	1927—Imports Barrels	Value	—1928 Barrels	Value
January	75,346	$ 254,072	56,400	$204,875	193,175	$ 269,661	234,753	$342,797
February	71,404	233,985	62,828	221,620	130,421	200,680	164,408	217,525
March	67,956	240,165	74,983	265,719	181,145	261,519	235,930	330,074
April	72,383	243,832	....	....	191,868	313,262	....	....
May	59,332	205,574	....	....	178,929	263,618	....	....
June	69,205	237,281	....	....	129,111	201,682	....	....
July	72,337	229,737	....	....	175,035	249,665	....	....
August	61,371	209,198	....	....	117,605	170,167	....	....
September	57,888	207,817	....	....	233,066	297,716	....	....
October	67,639	230,668	....	....	221,274	321,777	....	....
November	79,869	257,476	....	....	141,485	190,419	....	....
December	62,099	226,960	....	....	156,609	209,205	....	....
	816,829	$2,776,765	....	....	2,049,723	$2,949,371	....	....

Advertising Good Aggregates Effectively

WISCONSIN MINERAL AGGREGATE ASSOCIATION is issuing an effective series of newspaper advertisements, examples of which appear on this and the facing page. They are also used as direct mail circulars for one week before the advertisement appears in the daily papers pre-prints on enameled paper are sent to a list of 1800 names covering material men, architects, engineers, concrete products manufacturers, state and county highway officials and others who would be especially interested in them. They are published in leading dailies of wide circulation in the state to reach the general public and to educate it to the necessity of using only cleaned and screened aggregates in making concrete.

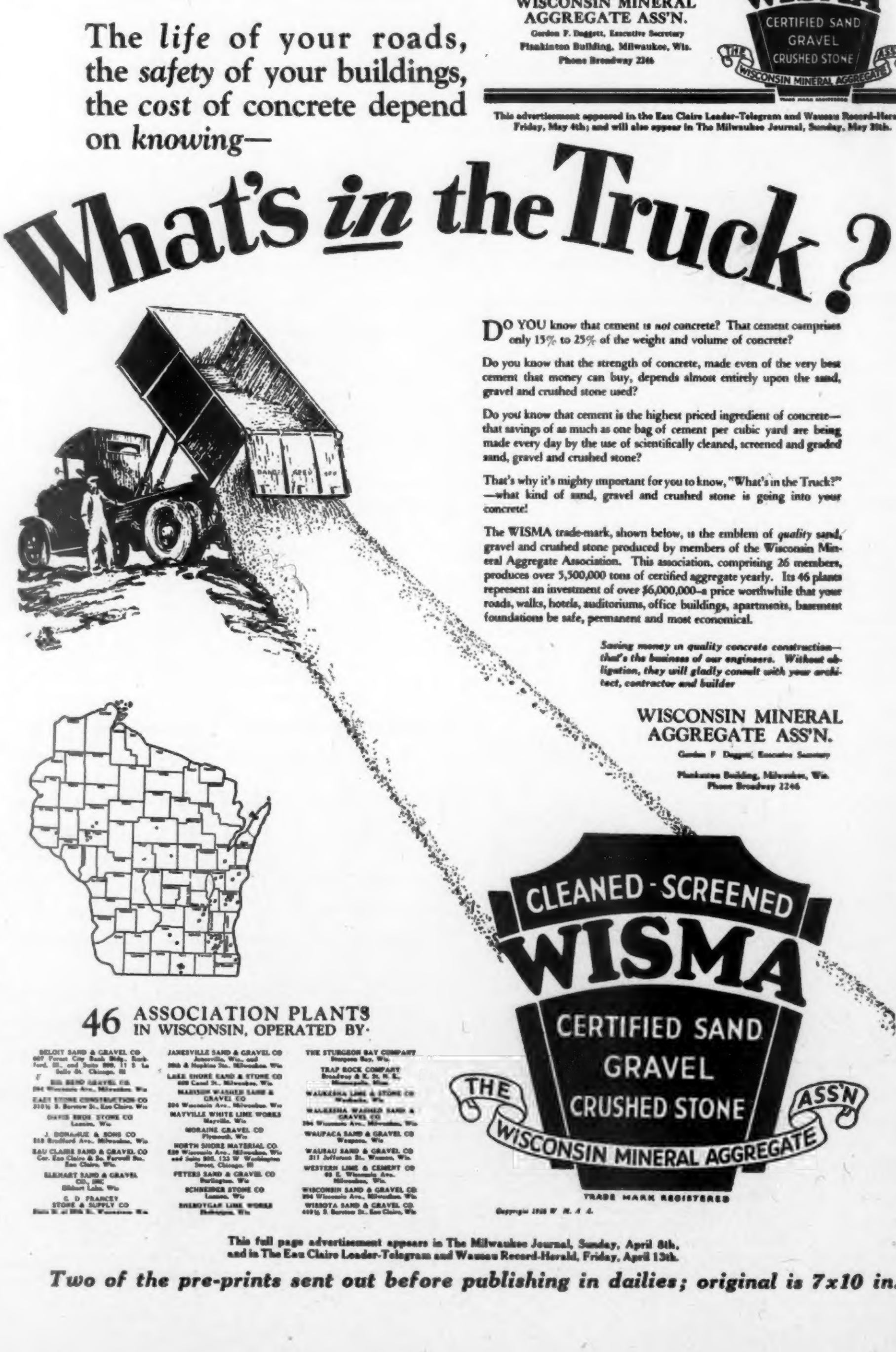
G. F. Daggett, executive secretary of the association, writes that newspaper advertising at stated intervals over a period of three or four months appeared to be the best method of reaching the public. The necessity of reaching the public, which, in the last analysis is the ultimate consumer of aggregates, is generally conceded. The people need to know that fact which the engineer has almost ceased to think about since it is so much a matter of course with him, that there is no excuse for poor concrete, as standard portland cement and good aggregates are everywhere obtainable at a reasonable price. If a man accepts the use of other than these materials he does so through ignorance and the breaking down of this ignorance is about the most important job the aggregate producers of the country have before them at the present time. The short, forceful paragraphs of the advertisement give the truth about aggregate and concrete very effectively.

Wisconsin is an especially good state for such advertising for, as has been often pointed out, it is "both blessed and cursed with an abundance of sand and gravel." Some of it is almost good enough to use as it comes from the ground, but the most of it needs to be put through a very thorough cleaning and screening process before it is fit to make concrete. The slogan, "Cleaned, screened, certified sand, gravel, crushed stone," means a real protection to the buyer of these materials, and the association's trade mark so prominently displayed in the advertisements is a guarantee of quality.

The advertisements have been highly commended by members of the national associations of producers of sand and gravel and crushed stone. They are reproduced here because they are in a way models of what advertisements of aggregates should be. Their main purpose, that of educating the public, is well carried out. They popularize the association trademark by displaying it sufficiently; they familiarize the public with the striking slogan and they show the location of the plants from which a superior product may be obtained.

Sault Ste. Marie Sand Co. Formed

THE ONTARIO SAND CO., Sault Ste. Marie, Ontario, which will operate at the Chene Island, above Point aux Pines, will begin operations this spring. The agreement the company has made with the Ontario government calls for an investment of over $1,000,000, according to James Lyons, the promoter of the company. A half-million yards will be moved every year, and this will require three or four boats. The sand is to be shipped to Detroit, Cleveland and Chicago. It is expected that employment will be given to over 100 men. Captain McLean, whose plant will form a small part of the equipment of the new company, will be manager. O. E. Fleming of Windsor is the president of the company.



Two of the pre-prints sent out before publishing in dailies; original is 7x10 in.

Reproduction of a pre-print which was afterwards published in a leading Wisconsin daily, enlarged to cover a full newspaper page

Traffic and Transportation

Car Loadings of Sand and Gravel, Stone and Limestone Flux

THE following are the weekly car loadings of sand and gravel, crushed stone and limestone flux (by railroad districts) as reported by the Car Service Division, American Railway Association, Washington, D. C.:

CAR LOADINGS OF SAND, GRAVEL, STONE AND LIMESTONE FLUX

District	Limestone Flux Week Ended Apr. 21	Limestone Flux Week Ended Apr. 28	Sand, Stone and Gravel Week Ended Apr. 21	Sand, Stone and Gravel Week Ended Apr. 28
Eastern	2,908	2,990	8,367	9,562
Allegheny	3,155	2,984	7,156	6,962
Pocahontas	469	459	1,036	883
Southern	660	544	11,195	10,032
Northwestern	1,183	1,294	5,166	7,483
Central Western	449	441	9,058	11,121
Southwestern	465	438	6,150	5,928
Total	9,289	9,150	48,128	51,971

COMPARATIVE TOTAL LOADINGS, BY DISTRICTS, 1927 AND 1928

District	Limestone Flux 1927 Period to Date Apr. 30	Limestone Flux 1928 Period to Date Apr. 28	Sand, Gravel and Stone 1927 Period to Date Apr. 30	Sand, Gravel and Stone 1928 Period to Date Apr. 28
Eastern	43,642	35,970	63,049	59,235
Allegheny	55,858	48,941	72,055	58,474
Pocahontas	4,878	4,764	8,871	10,607
Southern	8,488	9,074	174,684	155,617
Northwestern	18,200	13,093	58,656	46,651
Central Western	7,464	6,830	105,375	107,623
Southwestern	4,893	6,817	72,171	80,375
Total	143,423	125,489	554,861	518,582

COMPARATIVE TOTAL LOADINGS, 1927 AND 1928

	1927	***1928***
Limestone flux	***143,423***	***125,489***
Sand, stone, gravel	***554,861***	***518,582***

Proposed Changes in Rates

THE following are the latest proposed changes in freight rates up to the week beginning May 19:

SOUTHERN FREIGHT ASSOCIATION DOCKET

39833. **Sand, gravel, crushed stone, etc.**, from Stoney Creek Spur, N. C., to Norfolk and Portsmouth, Va. Present rate, 130c per net ton. Proposed rate on sand, gravel, crushed stone, etc., as described in Agent Glenn's I. C. C. A655—from and to points mentioned, 120c per net ton.

CENTRAL FREIGHT ASSOCIATION DOCKET

18353. To establish on **crushed stone**, carloads, East Liberty, Ohio, to Ohio, rates as shown below. Proposed rates, per net ton:

	Rate
Chillicothe, Ohio (routing N. Y. C.-Columbus-N. & W.)	100
Washington, C. H., Ohio (routing, N. Y. C.-Columbus-B. & O.)	100
Bloomingburg, Ohio (routing, N. Y. C.-Columbus-B. & O.)	95
Piqua, Ohio (routing, N. Y. C.-Wapakoneta-B. & O.)	95

Present rates—Classification basis.

18354. To establish on **sand and gravel**, carloads, Burr Oak, Ind., to Chicago, Ill. (Erie R. R. delivery), rate of 90c per net ton. Route via N. Y. C. & St. L.-Rochester, Ind., and Erie R. R. Present rate—90c per net ton, via N. Y. C. & St. L. R. R.-Chicago, Ill.

18355. To establish on **crushed stone and stone screenings**, in bulk, in open cars, carloads, Greencastle, Ind., to Cat Fish Siding, Ill., via K. & S. R. R., rate of 88c per net ton. Present rate—$1.01 per net ton.

Note 1—Minimum weight marked capacity of car.

Note 2—Minimum weight 90% of marked capacity of car.

Note 3—Minimum weight 90% of marked capacity of car, except that when car is loaded to visible capacity the actual weight will apply.

18356. To establish on **sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica **and gravel**, carloads, Marion, Ind., to Indiana and Ohio, rates as shown below (in cents per net ton).

To—	Pres. rate	Prop. rate
Willshire, Ohio	6th class	85
Pleasant Mills, Ind.	6th class	85
Decatur, Ind.	6th class	80
Peterson, Ind.	6th class	80
Craigville, Ind.	6th class	80
Bluffton, Ind.	6th class	73
Liberty Center, Ind.	6th class	73
Buckeye, Ind.	6th class	68
Warren, Ind.	68	*68
Van Buren, Ind.	68	*68
Landess, Ind.	68	*68
Hanfield, Ind.	68	*68
Roseburg, Ind.	80	68
Herbst, Ind.	80	68
Swayzee, Ind.	80	68
Sims, Ind.	80	68
Sycamore, Ind.	80	68
Greentown, Ind.	80	68
Vermont, Ind.	80	73

*No change.

18357. To establish on **sand and gravel**, carloads, Burr Oak, Ind., to Union Center, Ind., rate of 90c per net ton. Route—Via N. Y. C. & St. L. R. R., Walkerton, Ind., and B. & O. R. R. Present rate—Sixth class.

18352. To establish on **sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica) and **gravel**, carloads, from Gravel Bank and Marietta, Ohio, to West Virginia, rates as illustrated in Exhibit A attached. Present rates—As illustrated in Exhibit A.

EXHIBIT "A."

Illustrations.

Sand and Gravel, Carloads, From Gravel Bank and Marietta, Ohio.

In cents per net ton.

To—	Prop. rate	Pres. rate
Alexander, W. Va.	130	160
Arden, W. Va.	120	170
Bane, W. Va.	110	160
Bens Run, W. Va.	80	105
Board Tree, W. Va.	120	185
Burnsville, W. Va.	130	180
Castlebrook Siding, W. Va.	90	125
Century Mine No. 2, W. Va.	130	185
Clifton, W. Va.	100	115
Consolidation No. 21, W. Va.	110	160
Consolidation No. 38, W. Va.	120	175
Consolidation No. 54, W. Va.	110	160
Cookman, W. Va.	140	200
Crown City, W. Va.	120	150
Dola, W. Va.	110	160
Elwell, W. Va.	110	140
Flower, W. Va.	110	140
Gaston, W. Va.	120	185
Green Bottom, W. Va.	120	150
Hammett Siding, W. Va.	80	90
Heaters, W. Va.	130	185
Hornbrook, W. Va.	100	125
Hutchinson, W. Va.	120	160
Jamison C. & C. Co. (No. 8), W. Va.	120	175
Kanawha, W. Va.	70	90
Laurel Creek Mine, W. Va.	120	175
Littleton, W. Va.	120	185
McWhorter, W. Va.	110	150
Mercers Bottom, W. Va.	110	140
Millwood, W. Va.	90	110
Newlon, W. Va.	130	230
Parkersburg, W. Va.	70	‡180* 70
Porters Falls, W. Va.	100	140
Red Rock, W. Va.	120	180
Riverdale, W. Va.	110	160
St. Marys, W. Va.	80	100
Shinnston, W. Va.	110	160
Sparlin, W. Va.	120	160
Ten Mile, W. Va.	130	205
Valley Falls, W. Va.	120	160
Weese, W. Va.	140	200
West Union, W. Va.	90	125
Wolf Summit, W. Va.	100	125
Blaser, W. Va.	120	205
Berryburg Jct., W. Va.	130	185
Iris Mine, W. Va.	130	185
Simpson, W. Va.	110	150
Pennois, W. Va.	120	160
Consolidation No. 40, W. Va.	110	160
Sago, W. Va.	130	205
Flatwoods, W. Va.	130	185
Gauley Mill, W. Va.	150	205
Pennsboro, W. Va.	90	120
Colfax, W. Va.	120	160
Barnestown, W. Va.	120	185
Wilfong, W. Va.	130	185
Wheeling, W. Va.	110	160
Jacksonburg, W. Va.	100	140
Burns Mine, W. Va.	110	160
Waverly, W. Va.	70	90
New Haven, W. Va.	90	115
Clover, W. Va.	120	150
Hoard, W. Va.	120	150
Hoard, W. Va.	130	205
Triadelphia, W. Va.	110	205
Elkland, W. Va.	150	†380
Quickle, W. Va.	140	†380
Conley, W. Va.	130	205
M. & K. Jct., W. Va.	130	205
Morgantown, W. Va.	130	205

*Applies from Gravel Bank, Ohio, only.
†Per Jones' Tariff No. 218E, I. C. C. 1976.
‡Applies from Marietta, Ohio, only.

18359. To establish on **sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica) and **gravel**, carloads, Macksville and Terre Haute, Ind., to Illinois, rates as shown below. Present and proposed rates—In cents per net ton.

To—	Present.	Proposed.
Avena, Ill.	101	95
Bluff City, Ill.	101	95
Brownstown, Ill.	101	95
Greenville, Ill.	113	101
Hagerstown, Ill.	113	101
Lutz Spur, Ill.	113	101
Mulberry Grove, Ill.	113	101
Smithboro, Ill.	113	101
Vandalia, Ill.	101	95

18362. To establish on **crushed stone** and **stone screenings**, in bulk, in open cars, carloads, Centerville, Ohio, to Marion, Ind., via Penn. R. R., rate of $1.20 per net ton. Present rate—$3.30 per net ton.

18372. To establish on **sand**, blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica, carloads, from Phalanx, Ohio, to New Wilmington, Penn., rate of $1.01 per net ton. Present rate—No through rates in effect.

18374. To establish on **sand** (except blast, core, engine, filter or furnace, foundry, glass, grinding or polishing, loam, molding or silica) and **gravel**, carloads, Wolcottville, Ind.

To—	Present.	Proposed.
Blissfield, Mich.	Sixth class	90c N. T.
Pioneer, Ohio	Sixth class	88c N. T.
Morenci, Mich.	Sixth class	88c N. T.
Fitch, Ohio	Sixth class	88c N. T.

Route—Wabash and T. & W. R. R.

18391. To establish on **sand and gravel**, all kinds, carloads, Chillicothe, Ohio, to Stoutsville and Amanda, Ohio, rate of 80c per net ton. Present rate—90c per net ton.

18394. To establish on **molding sand**, carloads, Riverside and Coloma, Mich., to Sandusky, Ohio, rate of $2.27 per net ton. Present rate—Sixth class.

18396. To establish on **sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding, polishing, loam, molding or silica) and **gravel**, carloads, Attica, Ind., to Mechanicsburg, Ill., rate of 101c per net ton. Route—Via Wabash Ry., Decatur, Ill., and Illinois Traction System. Present rate—17c (6th class).

18397. To establish on **crushed stone** and **stone screenings**, in bulk, in open cars, carloads, Kenneth, Ind., to Toedo, Ohio, via the Penn. R. R., rate of $1.45 per net ton. Present rate—$3.90 per net ton.

18398. To establish on **crushed stone**, carloads, Whitehouse, Ohio, to Cone, Mich., rate of 75c per net ton. Present rate—85c per net ton.

18399. To establish on **crushed stone**, carloads, Whitehouse, Ohio, to stations on the T. & I. R. R., rates as shown below. Present and proposed rates—In cents per net ton.

To—	Present.	Proposed.
Swanton, Ohio	Sixth class	80
Delta, Ohio	Sixth class	90
Wauseon, Ohio	Sixth class	90
Stryker, Ohio	Sixth class	90
Bryan, Ohio	Sixth class	95

18400. To establish on **crushed stone**, carloads, Whitehouse, Ohio, to stations on T. & W. Ry., rates as shown below. Present and proposed rates—In cents per net ton.

To—	Present.	Proposed.
Trilby, Ohio	100	70
Sylvania, Ohio	100	70
Allen Junction, Ohio	(*)	80
Metamora, Ohio	(*)	80
Lyons, Ohio	(*)	85
Fayette, Ohio	(*)	90
Pioneer, Ohio	(*)	100

(*)—Sixth class.

Route—Via Wabash Ry. and Toledo, Ohio.

18403. To establish on **crushed stone and crushed stone screenings**, carloads, Bluffton, Ind., rate of 95c per net ton. Route—N. Y. C. & St. L. R. R., Ft. Wayne, Ind., and N. Y. C. R. R. Present rate—$1.01 per net ton.

18406. To establish rate of $1.66 per gross ton, on **crude** or **raw dolomite**, carloads, McVittys and Carey, Ohio, and other points in Group E to Kenova, W. Va., for C. & O. Ry. and N. & W. Ry. delivery. Present rate—Sixth class, viz., 20½c.

18485. (a) To cancel Germantown, Ohio, as point or origin, and to (b) establish, in lieu thereof, Carlisle, Ohio, as point of origin in connection with rates on **sand** and **gravel**, carloads, to destinations published in Cincinnati Northern R. R. Trf. 1703-O, Cincinnati Northern R. R. Trf. 1906A, except to stations on the B. & O. R. R. (See below). (c) To cancel rates on sand and gravel, carloads, from Germantown, Ohio, to stations on the B. & O. R. R., shown in Exhibit A, attached to and made a part hereof.

EXHIBIT A.

Rates on Sand and Gravel From Germantown, Ohio.

Index No.	To B. & O. R. R. Stations—	
41	Kylesburg, Ohio	80
67	Cincinnati, Ohio	70
69	Winton Place, Ohio	70
70	Winton Junction, Ohio	70
74	Mussellman, Ohio	110
79	Roman, Ohio	90
82	Fairmount, Ohio	70
84	Southside, Ohio	70
85	College Hill Junction, Ohio	70
86	Ivorydale, Ohio	70
87	Tweedvale, Ohio	70
88	Elmwood Place, Ohio	70
89	Steelton, Ohio	70
90	Carthage, Ohio	70
91	Hartwell, Ohio	70
92	Maplewood, Ohio	70
93	Lockland, Ohio	70
94	Wyoming, Ohio	70
95	Park Place, Ohio	70
96	Woodlawn, Ohio	70
97	Glendale, Ohio	70
98	Stockton, Ohio	70
99	Hamilton, Ohio	70
100	Overpeck, Ohio	70
101	Busenbark, Ohio	70
102	Trenton, Ohio	70
103	Poast Town, Ohio	60
105	Miamisburg, Ohio	60
106	Whitfield, Ohio	60
107	Dayton, Ohio	60
108	Tippecanoe City, Ohio	80
109	Troy, Ohio	80
110	Eldean, Ohio	90
111	Piqua, Ohio	90
112	Kirkwood, Ohio	90
113	Sidney, Ohio	90
114	Swanders, Ohio	90
115	Anna, Ohio	90
116	Botkins, Ohio	90
117	Wapakoneta, Ohio	90
118	Cridersville, Ohio	100
119	Lima, Ohio	100
124	Rockdale, Ohio	70
125	South Excello, Ohio	70
126	Middletown, Ohio	70
128	Zimmerman, Ohio	80
129	Alpha, Ohio	80
130	Trebein, Ohio	80
131	Xenia, Ohio	80
132	New Jasper, Ohio	90
133	Jamestown, Ohio	90
134	Edgefield, Ohio	90
135	Octa, Ohio	90
136	Milledgeville, Ohio	90
137	Luary, Ohio	90
138	Washington Court House, Ohio	90
142C	McGonigle, Ohio	90
142E	Oxford, Ohio	90

18418 (2)—To establish on **sand and gravel**, C. L., Wapakoneta, Ohio, to Minster, Ohio, rate of 70 cents per net ton. Route: Via N. Y. C. R. R.-St. Marys, Ohio-N. K. P. R. R. Present rate: 6th class.

18466. (2)—To establish on **gravel and sand**, other than blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica, C. L., Brilliant, Ohio, to Broadacre, Ohio, rate of 60 cents per net ton. Present rate: 80 cents per net ton.

18467. (2)—To establish on **sand and gravel**, C. L., from Randles and Coshocton, Ohio, to points in Ohio rates as shown in Exhibit A attached hereto. Present rates: As shown in Exhibit A attached.

EXHIBIT A

Proposed Rates on Sand and Gravel, Carloads From Randles, Ohio,

To	Prop.*	To	Prop.*
Walhondling	60	Dennison	80
Conesville	60	Dover	80
West Lafayette	60	Newark	80
Trinway	60	New Philadelphia	80
New Comerstown	60	Valley Junction	85
Brink Haven	65	Mansfield	90
Frazeysburg	65	Jewett	90
Black Run	70	Cadiz	95
Hanover	75	Columbus	95
Zanesville	75	Steubenville	100

*Proposed rates in cents per ton of 2000 lb.

Present rates, sixth class.

From Coshocton, Ohio (rates in cents per net ton)

To	Prop.	Pres.
Trinway	60	70
New Comerstown	60	70
Frazeysburg	70	65
Zanesville	80	75
Valley Junction	90	85
Cadiz	100	95
Steubenville	110	100

*Rates in cents per net ton.

18468. (2)—To establish on **sand**, viz.: Blast,core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica, C. L., Campbells and Centreton, Ind., to Chicago, Ill., and Chicago rate points, rate of $1.90 per net ton. Present rate: $2.02 per net ton.

18471. (2)—To establish on **agricultural lime**, C. L., Marble Cliff, Ohio, to Lathrop, Ohio, via Federal Valley R. R., rate of 10 cents. Route: Penna. R. R., Columbus, Ohio, Palos, Ohio, Federal Valley R. R. Present rate: 16½ cents.

18473., (2)—To establish on **sand** and **gravel**, C. L., Brevoorts, Ind., to points in Indiana, rates as shown below:

(Rates in cents per net ton)

To—			
		Cynthiana	75
Skelton	70	Nisbet	80
Johnson	75	Davy	80
Antioch	75	Evansville	80

Present rate: Sixth Class.

18474. (2)—To establish on **sand and gravel**, C. L., from Connersville, Ind., to Hagerstown, Ind., rate of 70 cents per net ton. Present rate: Sixth Class.

18482. To establish on **crushed stone**, carloads, Ingalls, Ind., to Goldsmith, Ind. (N. Y. C. & St. L. R. R.), rate of 90c per net ton. Present rate, sixth class.

18483. To make the following revision in rates on **limestone**, carloads, between points in C. F. A. territory as described in C. F. A. T. B. Tariff 130R, and from aforesaid C. F. A. territory to destinations east of the western termini of Eastern Trunk Lines. (a) To restrict commodity rates and ratings on crude, crushed, crude fluxing, crushed fluxing, fluxing, foundry and furnace limestone, so as to apply only when shipped in open top equipment. The rate application is to be covered by a note to read: "During period of car shortage when open top equipment is not available and closed equipment is furnished at carrier's option, the basis for rates provided herein will apply." (b) To provide for the application of ground limestone commodity rates and ratings when the aforesaid commodities are shipped in box cars, except when the rate on ground limestone is the same as or lower than published on limestone, viz., crude, crushed, crude fluxing, crushed fluxing, fluxing, foundry or furnace.

18484. To established on **crushed stone**, carloads, Lewisburg, Ohio, to Dillsboro, Ind. (B. & O. R. R.), rate of $1.10 per net ton. Present rate, sixth class.

NEW ENGLAND FREIGHT ASSOCIATION DOCKET

14546. **Molding sand**, carloads (See Note 3), from Mechanicsville, N. Y., to Group 1 stations in New York City as shown in B. & M. R. R. I. C. C. No. A-2568, 15½, via Troy, N. Y., and N. Y. C. R. R. Reason—To establish a rate to Group 1 points comparable with rates in effect to contiguous points.

14556. **Stone**, broken or crushed, in bulk, gondola or other open top cars, carloads (See Note 2), from Bradford, R. I., to Hope Valley, R. I., 60c per net ton, via Wood River Jct. Reason—To provide a rate that will compete with motor truck movement.

14532. **Gravel**, carloads (See Note 2), from New Haven, Conn., 95c per net ton. Reason—To permit of a movement of this gravel by rail at a figure comparable with that in effect on gravel ½% or more in diameter.

SOUTHWESTERN FREIGHT BUREAU DOCKET

14881. (1)—**Limestone**, between points in southwestern territory. To establish for single line application scale based on 8½ per cent of the I. C. C. Docket, 13535, Column 100, rates. Joint line rates to be made 1 cent over the single line rates to and including distances up to 300 miles, and one-half cent over single line rates for distances over 300 miles up to and including 460 miles, the single and joint line scale to be the same beyond 460 miles, on ground limestone and agricultural limestone, carloads, minimum weight 80,000 lb., or marked capacity of car if less than 80,000 lb., between points in S. W. F. B. territory for interstate application. Shippers in Texas have repeatedly complained with regard to rates on ground limestone from Texas to points in the Southwest, as compared particularly with the rates applicable from points in Oklahoma to points in Texas, and the above is intended to make a uniform adjustment within the Southwest and remove the present inconsistencies.

14817. **Crushed stone**, from points in Louisiana to points in Texas and Louisiana. To establish the following rates in cents per ton of 2000 lb. on crushed stone, carloads, from Tate and Whitestone, Ga., to points shown below:

To		
	To Vicksburg	215*
Shreveport, La.	Vicksburg to Shreveport	140†
	Total	355
Abilene, Tex.	Byd. Shreveport	230‡
	Total	585
Austin, Tex.	Byd. Shreveport	220‡
	Total	575
Brownsville, Tex.	Byd. Shreveport	310‡
	Total	665
Corpus Christi, Tex.	Byd. Shreveport	270‡
	Total	[1]625
Dallas, Tex.	Byd. Shreveport	160‡
	Total	515
El Paso, Tex.	Byd. Shreveport	320‡
	Total	675
Amarillo, Tex.	Byd. Shreveport	310‡
	Total	665
Beaumont, Tex.	Byd. Shreveport	160‡
	Total	515
Clarendon, Tex.	Byd. Shreveport	270‡
	Total	625
Corsicana, Tex.	Byd. Shreveport	170‡
	Total	525
Electra, Tex.	Byd. Shreveport	240‡
Sweetwater, Tex.	Total	595
Ft. Worth, Tex.	Byd. Shreveport	160‡
	Total	515
Galveston, Tex.	Byd. Shreveport	200‡
	Total	[2]555
Levelland, Tex.	Byd. Shreveport	310‡
	Total	665
Houston, Tex.	Byd. Shreveport	170‡
	Total	[3]525
Midland, Tex.	Byd. Shreveport	290‡
	Total	645

*Minimum weight 90% of marked capacity of car, except when car is loaded to full visible capacity actual weight shall govern. G. F. O. 721B, J. H. Glenn's 88A, I. C. C. A655.

†Minimum weight marked capacity of car, but not less than 60,000 lb. V. S. P. Tariff 197F, I. C. C. B132.

‡Note A—A. C. Fonda's I. C. C. 232.

Note A—Minimum weight 50,000 lb., or marked capacity of car if that be less than 50,000 lb.

[1]Proposed from Tate, Ga., only as instructions have been given to reduce the present rate of $7.10, published in S. W. L. Tariff 1Q, on one day's notice.

[2]Proposed from Whitestone, Ga., only as instructions have been given to reduce the present rate of $7.40, published in S. W. L. Tariff 2L, on one day's notice.

[3]Proposed from Whitestone, Ga., only as instructions have been given to reduce the present rate of $7.10, published in S. W. L. Tariff 2L, on one day's notice.

It is proposed to establish through rates on crushed stone, carloads, from Whitestone, Ga., and Tate, Ga., to the Texas points involved, which reflect Vicksburg-Shreveport combination, with routing restrictions, thus placing New Orleans, La., gateways on a parity with Vicksburg, Miss.

Foreign Abstracts and Patent Review

Portland Cement Plant at Gargenville, France. The plant was built under difficulties in 1920. Since then it has continued to grow and add to its equipment until it now has an annual production of 300,000 tons. It is owned by Poliet et Chausson and is conveniently located on the Seine and near the Gargenville branch of the state railways. The plant itself covers an area of 3 hectares and has 150 hectares of chalk and clay quarries. The chalk contains 98% calcium carbonate and the clay is the so-called Soissonais lignite.

The coal arrives in barges and is unloaded and transported by modern equipment to storage holding 15,000 tons, a supply sufficient for one month and a half.

The power station comprises seven Babcock multitubular boilers, five of which are in constant operation. These furnish the steam to three turbo-alternators producing a 3-phase current of 50 cycles and 500 v. at 3000 r.p.m. The boilers have 250 sq.m. heating surface and are capable of vaporization of 5000 kg. steam per hour each. They are equipped with automatic stokers and draft and permit the use of any fuel. The steam consumption per kw.h. is very low, being only 5.6 kg. for the 1000 kw. turbo-alternators and 5.5 kg. for the 2000 kw. machine.

The equipment of the portland cement plant proper consists of three coal dryers, 12 m. long and 1.50 m. in diameter, with a concentric cylinder of smaller diameter. The coal is pulverized in "triplex" mills, 8.23 m. long and 1.30 m. in diameter. Three bucket elevators convey the pulverized coal to the hoppers feeding burners, from which it is distributed by a regulating apparatus.

The wet process is used in this plant. The materials are mixed to a slurry (40% water content) in agitated tanks. The material is discharged through a sieve with openings of about 2.5 to 3 mm. into tube mills where the grinding is completed until the residue on the 4900-mesh sieve is about 6%. These mills are 8 m. long and 1.675 m. in diameter. The slurry falls into a pit from which it is pumped into the tanks controlling the chemical composition. There are four reinforced concrete vats 20 m. in diameter and 4.50 m. deep provided with an agitating device of the "sun and planet" system. The slurry leaves through underground outlets and is pumped into the distributor over the feed end of the kiln, which has a capacity of 2 cu.m.

The plant has six rotary kilns, 62 m. long and 2.75 m. in diameter, which latter is increased to 3.05 m. in the burning zone. They are inclined 4% and lined with highly aluminous refractory brick. This lining is 23 cm. thick in the zone of highest temperature. The kilns revolve at a rate of one revolution per 90 seconds.

The coolers are 20.7 m. long and 2 m. in diameter, the latter end enlarged to 2.28 m.

The clinker storage has a capacity of 15,000 tons. Clinker is conveyed automatically to the grinding mills of which there are seven of the "triplex" type. The production of each of the six mills originally installed is seven tons cement per hour, the residue on the "4000-mesh" sieve being 10%. The seventh pulverizer installed in 1924 has a capacity of 12.5 tons cement per hour and is driven directly by a 500-hp. motor.

Eight cement silos are provided of 1000 tons capacity each. They are of reinforced concrete. Some of these serve the railroad, the others are intended for shipments by water. Automatic sacking machines are provided and four automatic barrel-filling machines. The daily shipments average 600 tons by water and 600 tons by rail. During heavy demand this figure rises to 1000 tons or 20,000 sacks.

The plant employs a total of only 480 laborers, including the labor employed in the quarries. *Rev. des. Mat. de Constn.* (1927), 215, 253-264.

Unit Weight of Portland Cement. Dr. Haegermann of the research laboratory of the German Association of Portland Cement Manufacturers at Karlshorst has made a study of the methods of determining the weight per unit volume of portland cement. He summarizes his investigations as follows:

The weight per unit volume of a powdered material is influenced by the size and shape of the container used in the measurements and by the method of filling the container.

To obtain results of practical value, the shape of the containers and the method of filling these with a powdered material should be made the subject of exact specifications and the latter be given general recognition.

The average weight of a hectoliter of portland cement is as follows:

Ordinary portland cement..................126.6 kg.
High strength portland cement..........120.2 kg.

The weight per unit volume of high strength portland cement is lower than that of ordinary portland cement due to its greater fineness. The value, 1.4, given formerly as the average unit weight of ordinary cements, applied to weight per cubic meter. The weight per cubic meter divided by 10 or 1000 does not give the hectoliter or the liter weight, nor can the weight per cubic meter be computed from the latter by multiplication. Neither does multiplying the liter weight by 100 yield the correct hectoliter weight.

The use of empirically determined computing factors leads to considerable variations, when the containers are filled by mechanical means (the Böhme apparatus or chute) or by hand and the liter weight determined. However, it is possible to determine approximately the hectoliter weight from the liter weight when the latter is obtained on material receiving a specified number of shocks upon entering the container. The formula applies: Liter weight "shaken" $\times$ 660 = hectoliter weight. It is assumed that standard procedure is followed.

The determination of weight per hectoliter from smaller quantities can be done by Dr. Goslich's method (*Zement*, No. 38, 1927), who lets cement drop from the bin into a 2-liter container. The height of drop, however, which can appreciably affect the results, remains to be determined by tests, so that multiplying the 2-liter weight by 5 would yield the weight per hectoliter. This method has the advantage of time saving and freedom from errors due to the personal equation. *Zement*, March 8, 1928.

Dry Buildings. Dipl. Ing. Amos, Hohendölzschen vor Dresden, pointed out that rationalization of building construction must naturally deal with securing dry buildings. Building construction of today requires rapid and economical erection of apartment buildings ready for occupancy after a minimum period of time. The moisture collecting in new buildings due to the masonry or concrete work or to the weather has severe disadvantages, as it reduces the heat protection afforded by the walls by nearly one-half and disappears slowly with ordinary airing. Tests were therefore made of artificial drying of new apartment buildings with coke ovens. The disadvantages and limited results of the latter have led to special processes insuring the drying of a building in a few days with relative economy by means of hot air. By this method a building can be occupied several months earlier than when natural airing is depended upon. Proceedings of annual convention of Association of German Lime Manufacturers, Berlin, March 2. *Tonindustrie-Zeitung,* March 21, 1928.

Tabular Summary of the Constituents of Portland Cement Clinker and of the Hydration Products of Hydraulic Cements. Dr. A. Guttman, director of the research institute of the iron portland cement industry of Germany, in conjunction with his associate, Dr. F. Gille, recently published an article on portland cement clinker and hydration products of

hydraulic cement. The paper is in tabular form and is a compilation of their own as well as American results of investigation in this field. He more or less positively identified various mineral constituents of clinker as follows:

1. *Alit.* Mixed crystals of mostly $3CaO \cdot SiO_2$ with varying amounts of $3CaO \cdot Al_2O_3$. Hexagonal plates.

2. *Belit.* $2CaO \cdot SiO_2$; calcium partially replaced by Fe, Mg, Mn.

3. *Dicalcium Silicate.* Ca_2SiO_4; rectangles rhombs and hexagons.

4. *Free Lime.* CaO; rounded dendrites.

5. *Celit.* Considerable Fe_2O_3.

6. *Calciumaluminate. a)* $3CaO \cdot Al_2O_3$, *b)* $5CaO \cdot 3Al_2O_3$, and $3CaO \cdot Al_2O_3$; granular, rarely octohedral. Rapid set with strength. $5CaO \cdot Al_2O_3$; mostly granular, slow set with little strength.

Crystals of Unknown Composition. Mostly spherical.

Felit (dicalciumsilicate). Ca_2SiO_4; elongated crystals with cleavage planes.

Glass. Large Al_2O_3 content.

The following five products of hydration were observed:

1. *Calcium Hydrate.* $Ca(OH)_2$; hexagonal prisms. Obtained by the hydration of normal and high calcium cement.

2. *Hydrate of Tricalcium Aluminate.* $3CaO \cdot Al_2O_3 \cdot 5\frac{1}{2}H_2O$; $3CaO \cdot Al_2O_3 \cdot 9H_2O$, $3CaO \cdot Al_2O_3 \cdot 7H_2O$; plates, needles and rounded needles. Obtained by the hydration of alumina-cement and clinker.

3. *Calcium - hydro - silicate.* $CaO \cdot SiO_2 \cdot nH_2O$; needles. Obtained by hydration of normal cement and clinker.

4. *Calciumsulfo-aluminate, Cement Bacillus, Etc.* $3CaO \cdot Al_2O_3 \cdot 3CaSO_4 + 30\text{-}42\ H_2O$; thin elongated crystals, hexagonal and truncated. Obtained by the action of sulfates.

5. *Silica-gel.* Obtained from normal set tests of clinker grains.

The writers will reveal at a late date the optical properties of these minerals. *Tonindustrie-Zeitung* (1928), 418.

Effect of Surface Condition of Aggregates. A note to an article on the hardening of concrete is of interest because it takes into account the effect of the surface condition of the aggregate used in formulas for concrete. The author says that based on the work of Feret, Fuller and Thompson, Young, Williams, Abrams and his own experiences he had devised these fundamental formulas for concrete which are:

$$(1)\quad P = A + (100 - A)\sqrt{\frac{d}{D}}$$

$$(2)\quad E = \Sigma_c = \Sigma \frac{P \cdot n}{\sqrt[2]{d}}$$

$$(3)\quad R = \left(\frac{C}{E} - 0.50\right) \times K \text{ (compact concrete)}$$

in which:

P = Weight of aggregate plus cement able to pass a screen with openings of the diameter d, as a percentage of the total weight of cement + sand + coarse aggregate.

A = Coefficient depending on the nature of the material, of the roughness of its surfaces and of the degree of plasticity required. For river gravels A varies from 8 to 12, for sand used with crushed stone one would choose a vaue of A between 10 and 15.

D = Maximum diameter of the coarse aggregate in mm.

d = Whatever diameter is chosen between zero and D. (Separating fine from coarse aggregate?)

c = Weight of mixing water in kilos corresponding to the weight in kilos of the aggregate of the diameter d.

$E = \Sigma_c$ = Weight (volume) corresponding to the total mixing water corresponding to the granulometric composition considered.

N = Coefficient varying with the density of the rock, the roughness of the surface and the degree of fluidity. It has the following values:

	Round River Gravel	Rough Broken Stone
Dry Concrete........	0.85	1.10
Molding concrete..	1.00	1.30
Pouring concrete..	1.20	1.50

The density of the rock is taken at 2.65 in all cases above quoted.

R = Resistance to compression in kg./cm.^{2}

C = Weight of cement in kg.

K = Coefficient varying with the quality of the cement, the time and the temperature of hardening.—*M. Bolomey, Bulletin technique de la Suisse romonde.*

Recent Process Patents

The following brief abstracts are of current process patents issued by the U. S. Patent Office, Washington, D. C. Complete copies may be obtained by sending 10c to the Superintendent of Documents, Government Printing Office, Washington, for each patent desired.

Process for Making Calcium Arsenate. A dry process for the manufacture of calcium arsenate in which the material is produced free from soluble salts, and suitable for use as an insecticide. Calcium oxide is hydrated with just enough water to be formed in a dry, powdered state. The resulting calcium hydroxide is treated with just enough arsenic acid to produce dry, powdered calcium arsenate. — *William C. Piver, U. S. Patent No.* 1,667,490.

Process for Manufacturing Molded Cement Bodies. A mortar is made by gaging a mixture of portland cement and sand or some other aggregate material with water containing glycerine. The mortar is next molded upon a gloss imparting surface into the desired shapes and then treated with a solution of sodium silicate and glycerin.—*Andrey Chatelain, U. S. Patent No.* 1,657,-956.

Process of Manufacturing Ceramic Products. The process consists of mixing sand, kieselguhr containing hydrated silica, slaked lime and enough water to render the mass moist and workable. The molded material is placed in a high pressure steam chamber and kept under a pressure of 10 atmospheres for approximately eight hours. At this steam pressure the temperature would be about 180 deg. C. During this period a large amount of hydrated silicic acid of the kieselguhr, together with probably some of the silica present, will react with the lime to form calcium silicate, which constitutes the real binder.—*Ludwig Kern, U. S. Patent No.* 1,666,936.

Process for Obtaining Alkaline-Earth-Metal Sulphides from Alkaline-Earth-Metal Sulphates. The process consists of dissolving the sulphate in molten sodium chloride and adding coke to obtain alkaline-earth-metal sulphide. The chloride is separated from the sulphide by sedimentation.—*Theodor Lichtenberger, Konrad Flor, U. S. Patent No.* 1,667,423.

Manufacture of Fertilizers. A method of manufacturing fertilizer which consists in incorporating ground peat with a mineral or organic calcium phosphate, treating the mixture with a mixture of phosphoric acid and sulfuric acid and then treating the mass with ammonia.—*Edward L. Pease, U. S. Patent No.* 1,668,464.

Plaster-Block Composition. A plaster block, possessing water proofing and sound proofing qualities and having a composition comprising approximately from a half to one part of sawdust mixed with about one part of plaster of paris. The gaging water contains 5% of liquid glue, 5% dextrine and about 10% sodium silicate.—*Frederick M. Venzie, U. S. Patent No.* 1,667,019.

Process and Apparatus for Mixing Quick-Setting Cementitious Materials. The process consists of hydrating quick-setting cement in a self-cleaning vertical mixing chamber, cylindrical in shape and provided with rotating scrapers attached to a vertical shaft. The outlet at the bottom is tangent to the inner surface of the cylinder to prevent obstruction of the discharged material. The rate of discharge and the rate of agitation control the rate and uniformity of hydration.—*George M. Thomson, assigner to Pennsylvania Gypsum Co., U. S. Patent No.* 1,660,242.

Process for the Production of Cellular Building Materials. The method consists of feeding a slurry of plaster of paris into an agitator or mixer and introducing colloidized water and a stream of air at the bottom of the agitator to render the mass cellular. The water is introduced to provide for the formation of air bubbles in the slurry and the colloid is added to increase the surface tension of the air bubbles. The air flow, which, together with the paddles of the agitator, regulates the degree of porosity of the slurry, is introduced in numerous fine streams through the floor of the mixer.—*George M. Thomson, assignor to Pennsylvania Gypsum Co., U. S. Patent No.* 1,660,402.

L. R. Ferguson Is Manager of Texas Portland

E. S. MORGAN of Dallas, vice-president and general manager of the Texas Portland Cement Co., who has resigned his position recently, has been succeeded by L. R. Ferguson of New York. Mr. Morgan's connection with the firm began about 12 years ago when he became associated with the International Cement Corp., of which the Texas company is a subsidiary organization.

Mr. Morgan assumed his position in Dallas after having served the company for six years in Argentina.

Mr. Ferguson has been associated with the International Cement Corp. as manager of the Louisiana plant and later as assistant to the president. He will come to Dallas with H. C. Koch, a vice-president of the organization.—*Dallas* (Texas) *News.*

Indians Repaid by Government for Pipestone Quarry

THE United States court of claims at Washington has recently rendered a judgment against the United States in favor of the Yankton Sioux Indians in Charles Mix county, Minnesota, for the sum of $322,000. This is in the suit known as the Pipestone claim. It was based upon a treaty made with the government in 1858 at which time Charles Mix was commissioner of Indian affairs and assisted in negotiating the treaty.

The appropriation will be distributed pro rata among the 1850 Yankton Sioux Indians of this county. This has been a long drawn out complicated legal battle continuing many years.—*Pipestone* (Minn.) *Leader.*

Indiana Belt Stone Merger Completed

THE third stone merger in the Indiana belt was completed recently when the Shawnee Stone Co., which operates the Shawnee quarry near Bloomington, Ind.; the Central Oolitic stone mill of Bloomington, Ind.; the W. R. Mahan mill at Chicago, Ill., and the Mahan Co., a sales organization of Chicago, were united in one company which is to be known as the Shawnee Stone Co., and which will be headed by J. L. Torpsy. W. R. Mahan is to be the vice-president and F. W. Wasmund, secretary-treasurer. The holdings of the merger company amount to several million dollars.

The new Shawnee Stone Co. will issue $700,000 first mortgage bonds and the money will be used for payment of properties acquired and for additional operating expenses. The general administrative offices of the new merger will be in the Citizens Loan and Trust Co. building at Bloomington, the estimating and drafting office will be in the new office building recently completed at the Central Stone Co. mill in Bloomington and sales offices in Chicago and New York. The Shawnee quarry, around which the new merger is built, was opened three years ago. It is one of the prominent quarries of the belt, and is equipped with an electric tramway which stacks blocks of stone along a runway over 700 ft. long. The quarry has an output of 2000 cars annually.

The Central stone mill, started in 1890, is one of the largest and most complete cut stone plants of the belt. The two Mahan companies of Chicago have been in operation for a quarter of a century. The Central mill has an output of 1200 cars of sawed stone annually.—*Indianapolis* (Ind.) *News.*

German Lime Manufacturer Visits American Plants

A RECENT visitor of ROCK PRODUCTS, and at several American lime plants, was Dipl.-Ing. Horest Laeger, chief engineer of Curt von Grueber, lime manufacturer, and lime-plant equipment manufacturer, Berlin, Germany. Mr. Laeger was particularly interested in hydrated lime equipment; as very little hydrated lime is made in Germany at the present time.

Dipl.-Ing. Horest Laeger

His company manufactures mixed-feed kilns of the continuous, automatic-discharge, vertical type, used extensively in Europe for both lime and portland cement manufacture. He believes there is an opportunity to use this type of kiln in the United States, particularly for the manufacture of hydraulic limes.

Mr. Laeger is one of the many friends made in Germany by Victor J. Azbe, consulting engineer, St. Louis, on the occasion of his trip to Europe in 1927 to inspect lime plants.

Drainage Board Cannot Dig Sand for Profit in Kansas

THE Kaw valley drainage district does not have authority to operate a sand plant for profit.

This was the ruling of the Kansas supreme court in the suit brought by the county attorney of Wyandotte county against the drainage board. The board contended the operation of the sand plant was incidental to its flood protection work, and that it was taking the sand from the river to help keep the channel deeper and offer less impediment to the flow of flood waters. Having this sand on hand, the board asserted it should be permitted to sell it.

The board has spent considerable sums on machinery to make the sand marketable. The court held the board had no authority to use money raised by taxation for the purchase of lands and equipment, or to pay employes to operate the plant as a commercial enterprise.—*Kansas City* (Mo.) *Star.*

Standard Slag Co.'s New Plant About Ready

THE Standard Slag Co.'s new crushing plant between Beaver, Penn., and East Liverpool, Ohio, is about ready to begin operations. It is announced that crushing is expected to begin by June 1. The plant will take care of the slag from the furnaces of the Pittsburgh Crucible Steel Co., Midland, Penn.

The primary crusher will be a No. 7½ gyratory and the secondary a 3-ft. Symons cone crusher. Sizing will be done by six vibrating screens, and this is a departure from the company's usual practice as all its other plants are equipped with rotary screens. The machinery will be housed in an all-steel structure.

The Standard Slag Co. has about 20 plants in several states. Its main office is in Youngstown, Ohio, and L. A. Beeghly is president.

Herzog Lime Reorganization

THE stone quarry and lime kiln, founded north of Kenton, Ohio, more than 35 years ago, by John Herzog when he came to this county from Tiffin and which has been known for many years as the John Herzog and Son Stone Quarry, has been incorporated as the Herzog Lime and Stone Co.

Bert Herzog, son of John Herzog, Fred Cramer and J. Del Miller, all of near Patterson, are listed as owners. They were granted permission to issue 2500 shares of preferred stock with par value of $100, and 5500 shares with no par value.

The lime and stone company is one of the best known quarries in the state, now employing more than 100 men. Thousands of dollars have been spent this spring in installing new machinery.—*Kenton* (Ohio) *Democrat.*

Cement Products

TRADE MARK REGISTERED WITH U. S. PATENT OFFICE

Large Tonnages of Cast Stone

Simbroco Stone Co., West Roxbury, Mass., Uses Wet Mix and Sand Molds for Big Production

THE cast stone industry in the United States has risen from an art, occupying a few men and little or no machinery in each unit, to an important industry. Some of the larger concerns occupy large factory buildings and employ a hundred men or more throughout the year. The raw materials and products are handled by labor saving machinery and the production is figured in tons.

A good illustration of the way the cast stone business has developed is found in the Simbroco Stone Co. of West Roxbury, Mass. About eight years ago it took over what now seems a comparatively small concrete products business, enlarging it and improving it until now it is one of the principal businesses of its kind in the United States.

The main part of the plant, where all the actual concrete work is done, is a single story building 500 ft. long and 60 ft. wide. The side walls are only the pillars needed to support the roof with windows between the pillars so that the interior is almost as light as it is outside. The room is spanned by two traveling cranes, one "Niles" and one "Toledo," both of 5-tons capacity. These do all the heavy work of the plant, lifting the molds and placing them, handling the casting ladle and finally removing the cast pieces and carrying them to the storage department.

The drawing and pattern making rooms are in a good sized building at one side in which is also the general office.

Aggregates Used

The wet cast method is used throughout, the aggregate being crushed limestone and marble. Both are New England products, the crushed limestone being bought from producers in western Massachusetts and the marble from quarries in Vermont. The aggregates are received in hopper-bottom cars on a track that runs beside the plant. From this they are unloaded and crushed and elevated to screens, then separated and run to bins at about the center of the long casting room. Cement is received and handled by another elevator.

The mix is made very wet in comparison with the recommendation for ordinary mass concrete, nine gallons of water being used for one sack of cement instead of the usual six to seven and a half. But this wet mix flows freely and works into all the corners and narrow places of the molds and the excess water is of no moment, as it is absorbed by the sand of which the mold is made.

Design of the Molds

Making the molds calls for skill and experience on the part of the workmen. The patterns are all of wood or plaster and they are carefully made to "draw" without breaking the mold. Wherever the design calls for undercutting the mold is made in pieces so that the undercut piece may be pulled out sidewise after the pieces that hold it in place have been lifted. Glue molds, which allow a pattern with some undercut to be drawn without breaking, are never used in wet cast work.

Ordinary beach sand is used for the molds, screened to take out all coarse pieces. It is fine and to the eye it would appear to be all finer than 20-mesh. It is tempered in something the same way that foundry mold-

The large room at the Simbroco plant with the prepared molds in front and finished pieces at the rear

Cast pieces being held for curing before they are delivered

The casting floor, showing the molds ready for filling

ing sand is tempered before being used.

The molds are made in a space which occupies about half of the long building. The pattern is placed on the prepared sand bed face down and sand is packed around it with pneumatic tampers. When the mold is complete the pattern is drawn by one or two men or in the case of a very large pattern by the crane. Drawing the pattern has to be very carefully done in order to avoid injuring the mold. Boards are placed around the edges for men to walk on in casting the piece and a stick with a tag is placed near the mold. This tag gives the job to which the piece belongs and any other details of finish and delivery that may be needed.

Mixing the Concrete

The concrete is mixed in a 1-yd. mixer and aggregates and water are all weighed or measured for each batch. The weighing of the aggregates is done in a special car that runs under the aggregate bins. Below the mixer is a pit into which the casting ladle is lowered by a crane to receive the contents of the mixer. The ladle is moved to the mold to be filled by the crane and lowered until a spout at the end is just above the mold and the concrete is allowed to run out through a gate.

The mold is dry enough so that water at once begins to seep into it and the mix continues to lose water in this way until it is about at "normal" consistency. This is shown by the strength of the finished concrete which is much higher than the original water-cement ratio would permit it to be.

Thirty-six hours is usually a sufficient hardening time to permit the piece to be removed from the mold. After the piece has been stripped it is carried to the end of the room and held for further curing. Then it is bush-hammered, polished or rubbed as is called for by the specifications.

One of the advantages of the method employed by the Simbroco company is that there is practically no limit to the size of piece that may be handled. It is not unusual for the concern to receive orders for very large pieces the weight of which will run into tons. But with the sand mold and the crane these large pieces can be handled as easily as small pieces.

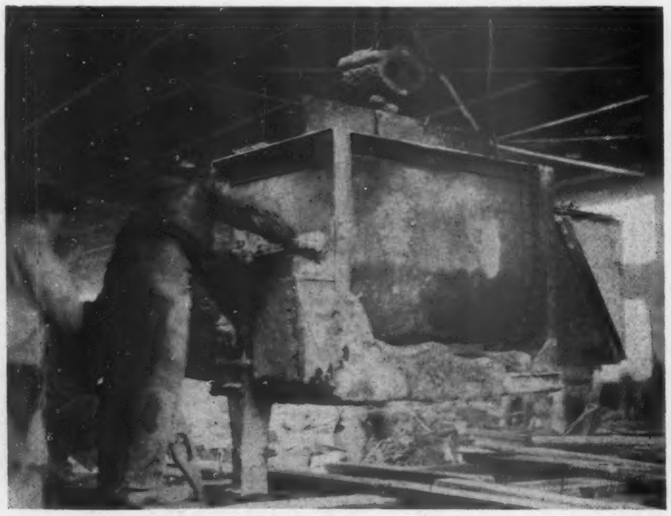
Find Good Market for Products

Boston and the surrounding towns and cities are naturally the great market for the product of this plant, but the business is by no means confined to this area. The firm has built up a reputation that extends beyond its immediate territory so that orders sometimes come from quite distant points. This is partly due to the excellent and uniform quality of the product, for it follows that

Drawing a pattern

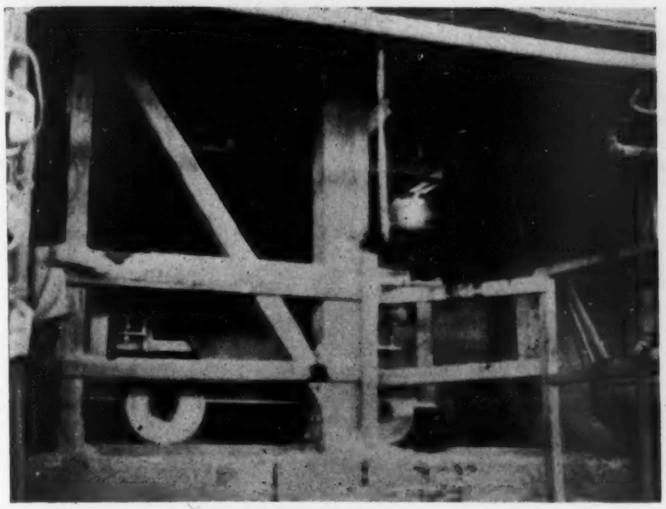
concrete mixed with weighed or measured quantities of materials and water and cast and cured under practically uniform conditions must be uniform.

The office of the Simbroco Stone Co. is at 161 Devonshire street, Boston, Mass. George S. Wilbur is president, Leo Benson is vice-

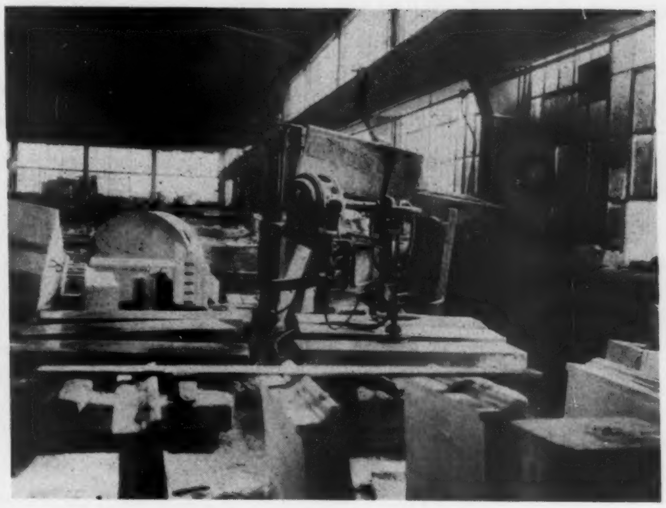


Filling a mold through the gate and spout of the ladle

Spotting the casting ladle over a mold



Loading the car used for weighing the aggregates



The polishing machine and some of the finished pieces

president and A. C. West is treasurer and manager at the plant. Mr. West is well known in the rock products industries of New England because he is president of the Massachusetts Sand and Gravel Association and treasurer of the Highland Sand and Gravel Co., one of the three concerns that recently formed the Metropolitan Sand and Gravel Co. of Boston.

Precast Stone Investigation

TESTS have been started at the U. S. Bureau of Standards to determine the physical properties of precast stone with the object of preparing Federal specifications for this material. Samples were obtained from various manufacturers scattered throughout the United States giving 17 different varieties of types of stone. The preliminary tests decided upon were: Compressive strength of wet and dry specimens, modulus of rupture, modulus of elasticity, rate of absorption, porosity, and ability to resist weathering.

The following are the methods used and the results obtained:

1. Because of the various shapes into which precast stone may be molded, the advisability as to the size of the specimens was taken into consideration and a comparison was made of the compressive strengths of cylinders 2 in. in diameter, 4 in. long; cylinders 2 in. in diameter, 2 in. long; and cylinders 1 in. in diameter, 2 in. long. It was found that the compressive strength as shown by the cylinders 2 in. in diameter, 4 in. long ranged from 3,200 to 8,200 lb./in.^{2}; that the 2 by 2 in. cylinder gave a strength varying from 5,640 to 9,400 lb./in.^{2}; while the 1 by 2 in. cylinders were approximately 8% lower in strength than the 2 by 4 in. cylinders.

2. Modulus of rupture as determined by tests on 1 by 1 by 8 in. prisms gave results that vary from 900 to 1,500 lb./in.^{2}

3. The modulus of elasticity as determined by means of the Tuckerman strain gauge on the cylinder 2 in. in diameter 4 in. long gave values ranging from 1,400,000 to 3,300,000 lb./in.^{2}

4. To determine the per cent absorption of water the specimens were dried at 110 deg. C. until their weight became constant, this usually requiring about 72 hours. The specimens were then immersed in water and taken out at intervals, the surplus water removed with a towel, and weighed. The increase in weight expressed as percentage of the dry weight was recorded as the absorption. The per cent absorbed at the end of 48 hours varied from 4.54 to 7.78. Upon boiling the specimens three hours an increase of from 5 to 150% over 48-hour cold-water absorption was noted.

5. The porosity was determined, assuming that all the pores were filled after three hours boiling, by using the formula:

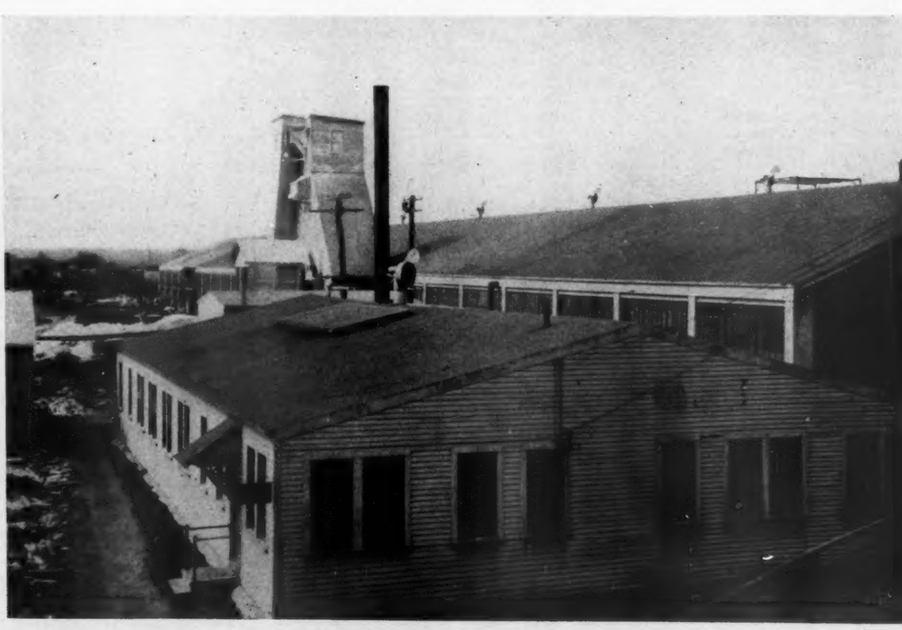
$$\text{Per cent porosity} = \frac{\text{Weight (after 3 hours boiling)} - \text{weight dry}}{\text{Weight (after 3 hours boiling)} - \text{weight suspended in water}} \times 100$$

6. Freezing and thawing weathering tests are now in progress. Eighteen cycles have been completed to date without any noticeable disintegration.—*Technical News Bulletin* of the U. S. Bureau of Standards.

Paraffin Solution Used on Molds for Cement Mortar Briquets

PARAFFIN solution has been found to be much better than oil for preventing cement mortar from adhering to briquette molds, glass plates, or any other laboratory apparatus, according to R. B. Dayton, materials engineer of the state road commission of West Virginia.

A 6 to 7% solution of paraffin in carbon tetrachloride is used instead of the customary heavy mineral oil. It may be applied with either a brush or rag. The surfaces of the molds are very easy to clean, requiring but slight brushing.—*Public Roads.*



General view of the Simbroco plant

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton, F.O.B., at producing point or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Buffalo, N. Y.	1.30	1.30	1.30	1.30	1.30	1.30
Chaumont, N. Y.	.50	1.75	1.75	1.50	1.50	1.50
Chazy, N. Y.	.75	1.75	1.60	1.30	1.30	1.30
Dundas, Ont.	.53	1.05	1.05	.90	.90	.90
Farmington, Conn.	....	1.30	1.10	1.00	1.00	....
Frederick, Md.	.50@ .75	1.35@1.45	1.15@1.25	1.10@1.20	1.05@1.15	1.05@1.10
Ft. Spring, W. Va.	.35	1.30	1.30	1.25	1.20	1.15
Munns, N. Y.	1.00	1.40	1.25	1.25	1.25	....
Prospect, N. Y.	1.00	1.40	1.25	1.25	1.25	....
Rochester, N. Y.—Dolomite	1.50	1.50	1.50	1.50	1.50	1.50
St. Vincent de Paul, Que. (n)	.75	1.35	1.15	.95	.85	1.35
Walford, Penn.	....	....	1.35h	1.35h	1.35h	1.35h
Watertown, N. Y.	1.00	1.75	1.75	1.50	1.50	1.50
Western New York	.85	1.25	1.25	1.25	1.25	1.25
CENTRAL:						
Afton, Mich.	....	....	....	....	....	.50@1.50
Alton, Ill.	1.85	....	1.85	....	....	....
Columbia and Krause, Ill.	.90@1.25	.80@1.35	1.00@1.35	.90@1.35	.90@1.35	....
Cypress, Ill.	1.00@1.25	1.00@1.25	1.20@1.25	1.20@1.25	1.20@1.25	1.35
Dubuque, Iowa (h)	.80	1.00	1.35	1.35	1.35	1.35
Greencastle, Ind.	1.25	1.10	1.10	1.10	1.00	1.00
Lannon, Wis.	.80	1.00	.90	.90	.90	.90
Linwood, Iowa	1.10	1.50	1.50	1.30	1.40	1.40
McCook, Ill.	1.00	1.25	1.25	1.25	1.25	1.25
Marblehead, Ohio (l)	.55	.80	.80	.80	.80	.80
Milltown, Ind.	....	.90@1.00	1.00@1.10	.90@1.00	.85@ .90	.85@ .90
Northern Ohio Points	.85@1.10	1.25	1.15	1.10	1.05	1.05
Sheboygan, Wis.	1.10	1.10	1.10	1.10	1.10	1.10
Stone City, Iowa	.75	....	1.20	1.10	1.00	1.00
Thornton, Ill.	.90	1.00	1.25	1.25	1.25	1.25
Toledo, Ohio	1.60	1.70	1.70	1.60	1.60	1.60
Toronto, Canada (m)	2.50	3.00	3.00	2.85	2.85	2.85
Valmeyer, Ill. (fluxing limestone)	.90@1.20	....	....	1.75	....	1.75
Waukesha, Wis.	....	.90	....	.90	.90	.90
Wisconsin Points	.50	....	1.00	.90	.90	....
Youngstown, Ohio	.70j	1.25l@1.35h	1.25l@1.35h	1.25l@1.35h	1.25l@1.35h	1.25l@1.35h
SOUTHERN:						
Cartersville, Ga.	1.25	1.65	1.65	1.35	1.15	1.15
Chico, Texas	1.00	1.30	1.25	1.20	1.10	1.05
Crystal River, Fla.	.50	....	1.75	1.75	1.50	....
El Paso, Tex.	1.00	1.00	1.00	1.00	1.00	....
Graystone, Ala.	Crusher run, screened, $1 per ton					
Kendrick and Santos, Fla.	3½ in. and less, $1 per ton					
Olive Hill, Ky.	....	1.00	1.00	1.00	1.00	1.00
Rocky Point, Va.	.50@ .75	1.40@1.60	1.30@1.40	1.15@1.25	1.10@1.20	1.00@1.05
WESTERN:						
Atchison, Kan.	.50	1.80	1.80	1.80	1.80	1.80
Blue Springs & Wymore, Neb.	.25	1.45	1.45	1.35c	1.25d	1.20
Cape Girardeau, Mo.	1.25	1.25	1.25	1.25	1.00	....
Rock Hill, St. Louis, Mo.	1.00	1.25	1.00@1.25	.90@1.25	.90@1.25	.90@1.25
Sugar Creek, Mo.	.75	1.00	1.20	1.20	1.20	1.20

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Birdsboro, Penn. (q)	1.20	1.60	1.45	1.35	....	1.30
Branford, Conn.	.80	1.70	1.45	1.20	1.05	....
Duluth, Minn.	.90@1.00	2.25	1.75	1.55	1.25	1.25
Eastern Maryland	1.00	1.60	1.60	1.50	1.35	1.35
Eastern Massachusetts	.85	1.75	1.75	1.25	1.25	1.25
Eastern New York	.75	1.25	1.25	1.25	1.25	1.25
Eastern Pennsylvania	1.10	1.70	1.60	1.50	1.35	1.35
Knippa, Tex.	2.50	2.25	1.65	1.35	1.25	....
New Britain, Plainville, Rocky Hill, Wallingford, Meridan, Mt. Carmel, Conn.	.80	1.70	1.45	1.20	1.05	....
Northern New Jersey	1.35@1.40	1.80@2.10	1.80@1.90	1.40@1.50	1.40@1.50	....
Richmond, Calif.	.75	....	1.00	1.00	1.00	....
Spring Valley, Calif.	.75	1.10	1.10	1.10	1.10	....
Springfield, N. J.	1.40	2.10	2.00	1.60	1.60	....
Toronto, Canad (m)	....	5.80	4.05	4.05	....	....
Westfield, Mass.	.60	1.50	' 35	1.20	1.10	....

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Berlin, Utley, Montello and Red Granite, Wis.—Granite	1.80	1.70	1.50	1.40	1.40	....
Cayce, S. C.—Granite	.50	....	1.80	1.80	1.65	....
Eastern Penn.—Sandstone	1.35	1.70	1.65	1.40	1.40	1.40
Eastern Penn.—Quartzite	1.20	1.35	1.25	1.20	1.20	1.20
Emathla, Fla.—Flint rock	1.00	....	2.35	....	....	....
Lithonia, Ga.—Granite	.75a	2.00b	1.75	1.40	1.35	....
Lohrville, Wis.—Granite	1.65	1.70	1.65	1.45	1.50	....
Middlebrook, Mo.	3.00@3.50	....	2.00@2.25	2.00@2.25	....	1.25@3.00
Richmond, Calif.—Quartzite	.75	....	1.00	1.00	1.00	....
Somerset, Penn. (sand-rock)			1.50 to 1.85			
Toccoa, Ga.	....	....	1.30	1.25	1.20	1.20

(a) Sand. (b) to ⅜ in. (c) 1 in., 1.40. (d) 2 in., 1.30. (e) Price net after 10c cash discount deducted. (f) 1 in. to ¼ in., 1.45; 2 in. to ¼ in., 1.35. High calcite fluxing stone, 1.40. (h) Less 10c discount. (j) Less 10% net ton. (l) Less .05. (m) Plus .25 per ton for winter delivery. (n) Crusher run for ballast, .85. (p) Carload prices. (q) Crusher run, 1.40; screenings for ¼-in. granolithic finish, 3.00.

Agricultural Limestone

(Pulverized)

Alton, Ill.—Analysis, 98% $CaCO_3$, 0.01% $MgCO_3$; 90% thru 100 mesh	6.00
Bettendorf and Moline, Ill.—Analysis, $CaCO_3$, 97%; 2% $MgCO_3$; 50% thru 100 mesh, 1.50; 50% thru 4 mesh	1.50
Blackwater, Mo.—100% thru 4 mesh	1.00
Branchton, Penn.—100% thru 20 mesh; 60% thru 100 mesh; 45% thru 200 mesh	5.00
Cape Girardeau, Mo.—Analysis, $CaCO_3$, 93½%; $MgCO_3$, 3½%; 50% thru 50 mesh	1.50
Cartersville, Ga.—50% thru 50 mesh	1.50
Pulverized, per ton	2.00
Chaumont, N. Y.—Pulverized limestone, bags, 4.00; bulk	2.50
Cypress, Ill.—Analysis, 88% $CaCO_3$; 10% $MgCO_3$; 50-90% thru 4 mesh	1.25
50-90% thru 100 mesh	1.35
Hillsville, Penn.—Analysis, 94% $CaCO_3$; 1.40% $MgCO_3$; 75% thru 100 mesh; sacked	5.00
Hot Springs and Greensboro, N. C.—Analysis, $CaCO_3$, 98-99%; $MgCO_3$, 42%; pulverized; 67% thru 200 mesh; bags	3.95
Bulk	2.70
Jamesville, N. Y.—Analysis 89% $CaCO_3$, 4% $MgCO_3$; pulverized; bags	4.25
Joliet, Ill.—Analysis, 52% $CaCO_3$; 44% $MgCO_3$; 90% thru 200 mesh	3.50
Knoxville, Tenn.—80% thru 100 mesh; bags, 1.25; bulk	2.70
Linwood, Iowa—Analysis, 98% to 94% $CaCO_3$; 1.1% and less $MgCO_3$; 99% thru 150 mesh; paper sacks	6.00
Marlbrook, Va.—Analysis, 80% $CaCO_3$; 10% $MgCO_3$; bulk	1.75
Marl—Analysis, 95% $CaCO_3$; 0% $MgCO_3$; bulk	2.25
Marion, Va.—Analysis, 90% $CaCO_3$, 2% $MgCO_3$; per ton	2.90
Middlebury, Vt.—Analysis 99.05% $CaCO_3$; 90% thru 50 mesh	6.00
Milltown, Ind.—Analysis, 94.50% $CaCO_3$, 33% thru 50 mesh, 40% thru 50 mesh; bulk	1.35@ 1.60
Olive Hill, Ky.—90% thru 4 mesh	1.00
Piqua, Ohio—Total neutralizing power 95.3%; 99% thru 10, 60% thru 50; 50% thru 100	2.50@ 2.75
100% thru 10, 90% thru 50, 80% thru 100; bags, 5.10; bulk	3.60
99% thru 100, 85% thru 200; bags, 7.00; bulk	5.50
Rocky Point, Va.—Analysis, $CaCO_3$, 97%; 50% thru 200 mesh, burlap bags, 3.50; paper, 3.25; bulk	2.00
Watertown, N. Y.—Analysis, 96-99% $CaCO_3$; 50% thru 100 mesh; bags, 4.00; bulk	2.50

Agricultural Limestone

(Crushed)

Bedford, Ind.—Analysis, 98% $CaCO_3$; 1%, $MgCO_3$; 95% thru 10 mesh	1.50

(Continued on next page)

Agricultural Limestone

Chico and Bridgeport, Tex. — 50% thru 100 mesh	1.50
Danbury, Conn.; Adams, Ashley Falls and West Stockbridge, Mass.—Analysis, 90% $CaCO_3$, 5% $MaCO_3$; 90% thru 50 mesh, bulk	3.50
100-lb. paper bags	4.75
100-lb. cloth bags	5.25
(All prices less .25, 15 days.)	
Dundas, Ont.—Analysis, 54% $CaCO_3$; $MgCO_3$, 43%; 50% thru 50 mesh	1.00
Ft. Spring, W. Va.—Analysis, 90% $CaCO_3$; 50% thru 50 mesh	1.00
Kansas City, Mo. — 50% thru 100 mesh	1.00
Lannon, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 99% thru 10 mesh; 46% thru 60 mesh	2.00
Screenings (¼ in. to dust)	1.00
Linwood, Iowa—Analysis, 98% $CaCO_3$, 1.10% or less $MgCO_3$; 99% thru 4 mesh	1.10
99% thru 10 mesh	1.25
Marblehead, Ohio—90% thru 100 mesh	3.00
90% thru 50 mesh	2.00
90% thru 4 mesh	1.00
McCook, Ill.—90% thru 4 mesh	.90
Middlepoint, Bellevue, Bloomville, Kenton and Whitehouse, Ohio; Monroe, Mich.; Bluffton, Greencastle and Logansport, Ind.—85% thru 10 mesh, 20% thru 100 mesh	1.50
Moline, Ill., and Bettendorf, Iowa—Analysis, 97% $CaCO_2$, 2% $MgCO_3$; 50% thru 100 mesh; 50% thru 4 mesh	1.50
Mountville, Va. — Analysis, 76.60% $CaCO_3$; $MgCO_3$, 22.83%, 100% thru 20 mesh; 50% thru 100 mesh, paper bags, 4.50; burlap bags	5.00
Stone City, Iowa — Analysis, 98% $CaCO_3$; 50% thru 50 mesh	.75
Waukesha, Wis.—90% thru 100 mesh, 4.50; 50% thru 100 mesh	2.25
Valmeyer, Ill.—Analysis, 96% $CaCO_3$, 2% $MgCO_3$; 100% thru 10 mesh	.90@1.50

Pulverized Limestone for Coal Operators

Hillsville, Penn., sacks, 4.50; bulk	3.00
Joliet, Ill. — Analysis, 50% $CaCO_3$; 42% $MgCO_3$; 95% thru 100 mesh; paper bags (bags extra)	3.50
Linwood, Iowa — Analysis, 94-98% $CaCO_3$; 1.10% and less $MgCO_3$; 100% thru 20 mesh, 50% thru 200 mesh; paper sacks	6.00
Marblehead, Ohio — Analysis, 83.54% $CaCO_3$; 14.92% $MgCO_3$; 99.8% thru 100 mesh; sacks	4.25
Piqua, Ohio, sacks, 4.50@5.00; bulk	3.00@ 3.50
Rocky Point, Va.—85% thru 200 mesh, bulk	2.25@ 3.50
Waukesha, Wis.—90% thru 100 mesh, bulk	4.50

Glass Sand

Silica sand is quoted washed, dried and screened unless otherwise stated. Prices per ton f.o.b. producing plant.

Cedarville and S. Vineland, N. J.	*1.75@ 2.25
Estill Springs and Sewanee, Tenn.	1.50
Franklin, Penn.	2.00
Klondike, Mo.	2.00
Massillon, Ohio	3.00
Michigan City, Ind.	.35
Ohlton, Ohio	3.00
Ottawa, Ill.	1.25
Red Wing, Minn.	1.50
San Francisco, Calif.	4.00@ 5.00
Silica and Mendota, Va.	2.00
St. Louis, Mo.	2.00
Utica and Ottawa, Ill.	.75@ 1.00
Zanesville, Ohio	2.50

Miscellaneous Sands

City or shipping point	Roofing sand	Traction
Dresden, Ohio		1.25
Eau Claire, Wis.	4.25	.65@1.00
Estill Springs and Sewanee, Tenn.	1.35@1.50	1.35@1.50
Ohlton, Ohio	*2.25	*2.25
Massillon, Ohio		2.00
Michigan City, Ind.		.30
Montoursville, Penn.		1.25
Ottawa, Ill.	1.25	1.25
Red Wing, Minn.		1.00
San Francisco, Calif.	3.50	3.50

(Continued on next page)

Wholesale Prices of Sand and Gravel

Prices given are per ton, F.O.B., producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
EASTERN:						
Asbury Park, Farmingdale, Spring Lake and Wayside, N.J.	.65	.55	1.00	1.35	1.40	
Attica and Franklinville, N. Y.	.75	.75	.75	.75	.75	.75
Boston, Mass.‡	1.40	1.40	2.25		2.25	2.25
Buffalo, N. Y.	1.10	1.05	1.05	1.05		1.05
Erie, Penn.	.60	.80			1.40	
Leeds Junction, Me.		.50		1.75	1.25	1.00
Machias Jct., N. Y.	.75	.60	.75		.60	.60
Montoursville, Penn.	1.00	.80	.75	.65	.65	.60
Northern New Jersey	.60	.60	1.25		1.25	
Somerset, Penn.		2.00				
Troy, N. Y.	.50@ .75*	.50@ .75*	.80@1.00*	.80@1.00*		.80@1.00*
F. o. b. boat, per yd.	1.50	1.50	1.75	1.75		1.75
Washington, D. C.	.50@ .55	.50@ .55	1.20	1.20	1.00	1.00
CENTRAL:						
Attica, Ind.	All sizes .75@.85					
Aurora, Moronts, Oregon, Sheridan, Yorkville, Ill.	.25@ .80	.50@ .70	.10@ .40	.50@ .70	.60@ .80	.60@ .80
Barton, Wis.		.40	.60	.65	.65	.65
Chicago District	2.00j					
Columbus, Ohio¶		.85	.85	.85	.85	
Des Moines, Iowa		.40	1.50	1.50	1.50	1.50
Eau Claire, Chippewa Falls, Wis.	.50	.50	.65		.95	
Elkhart Lake, Wis.	.60	.40	.50	.60	.50	.50
Ferrysburg, Mich.		.50@ .80	.60@1.00	.60@1.00		.50@1.25
Grand Haven, Mich.		.60@ .80	.70@ .90	.70@ .90		.70@ .90
Grand Rapids, Mich.	.50	.50	.90	.80	.70	.70
Hamilton, Ohio		1.00	1.00		1.00	
Hersey, Mich.		.50		.60	.70	.70
Humboldt, Iowa	.35	.35	1.35	1.35	1.35	1.35
Indianapolis, Ind.	.60	.60		.90	.75@1.00	.75@1.00
Mankato, Minn.		.45g		.60@1.25h	.70@1.25	1.25c
Mason City, Iowa		.50	.85	1.30	1.25	1.25
Mattoon, Ill.	.75@.85 all sizes					
Milwaukee, Wis.	.96	.91	1.06	1.06	1.06	1.06
Minneapolis, Minn.	.65*	.65*	1.75*	1.75*	1.75*	1.75*
St. Louis, Mo.	1.20e	1.45f	1.55a	1.45	1.45	1.45
St. Paul, Minn.	.35	.35	1.25	1.25	1.25	1.25
Terre Haute, Ind.	2.75	.60	.85	.75	.75	.75
Waukesha, Wis.		.45	.60	.60	.65	.65
Winona, Minn.	.40	.40	1.50	1.25	1.10	1.10
SOUTHERN:						
Brewster, Fla.	.50	.50	3.00	3.00		
Brookhaven, Miss.	1.25	.70	1.25	1.00	.70	.70
Charleston, W. Va.	River sand and gravel, all sizes, 1.40					
Eustis, Fla.	.45@ .50					
Fort Worth, Tex.	1.50	1.00@1.35	1.10@1.25	1.10@1.25	1.00@1.10	1.00@1.10
Knoxville, Tenn.	1.00	1.00	1.20	1.20	1.20	1.10
Macon, Ga.	.50	.50				
New Martinsville, W. Va.	1.10	1.00		1.30	1.10	.90
Roseland, La.	.15@ .25	.10@ .20	1.00@1.25	.65@ .85	.50@ .65	.50@ .65
WESTERN:						
Kansas City, Mo.	.70	.70@ .75				
Crushton, Durbin, Kincaid, Largo, Rivas, Calif.	.10@ .40	.10@ .40	.50@1.00	.50@1.00	.50@1.00	.50@1.00
Oregon City, Ore.	1.25*	1.25*	1.25*	1.25*	1.25*	1.25*
Otay, Calif.		.35@ .50	.60	.60	.60	.60
Phoenix, Ariz.	1.25	1.00	1.50	1.25	1.10	1.00
Pueblo, Colo.	.80	.60		1.20		1.15
Seattle, Wash.	1.25*	1.25*	1.25*	1.25*	1.25*	1.25*
Steilacoom, Wash.	.50	.50	.50	.50	.50	.50

Bank Run Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
Algonquin and Beloit, Wis.			Dust to 3 in., .40			
Brookhaven, Miss.						.60
Buffalo, N. Y.	1.10	.95		.85		.85
Burnside, Conn.		.75				
Des Moines, Iowa	.60					
Dresden, Ohio				.70	.65	
Eau Claire, Chippewa Fls., Wis					.65	
Fort Worth, Tex.						.85@ .90
Gainesville, Texas					.55	
Grand Rapids, Mich.				.50		
Hamilton, Ohio					1.00	
Hersey, Mich.				.50		.50
Indianapolis, Ind.		Mixed gravel for concrete work, at .65				
Moline, Ill. (b)	.60	.60	Concrete gravel, 50% G., 50% S., 1.00			
Oregon City, Ore.	1.25*	1.25*	1.25*	1.25*	1.25*	1.25*
Somerset, Penn.		1.85@2.00		1.50@1.75		
Steilacoom, Wash.	.25					
St. Louis, Mo.		Mine run gravel, 1.55 per ton				
Summit Grove, Ind.	.50	.50	.50	.50	.50	.54
Winona, Minn.	.40	.40	.60	.60	.60	.60
York, Penn.	1.10	1.00				

*Cubic yd. ‡Delivered on job by truck. (a) ⅝-in. down. (b) River run. (c) 2½-in. and less. ¶By truck only. (d) Delivered in Hartford, Conn., $1.50 per yd. (e) Mississippi River. (f) Meramee River. (g) Washed and screened river sand. (h) ¾-in to ¼-in. (j) Lake sand, 1.75, delivered.

Core and Foundry Sands

Silica sand is quoted washed, dried and screened unless otherwise stated. Prices per ton f.o.b. producing plant.

City or shipping point	Molding, fine	Molding, coarse	Molding, brass	Core	Furnace lining	Sand blast	Stone sawing
Albany, N. Y.	2.00	2.00	2.10			4.00	
Beach City, Ohio	1.75@2.25	1.75@2.25		1.75	1.75		
Dresden, Ohio	1.25@1.50	1.25@1.50	1.50@1.75	1.00@1.25			
Eau Claire, Wis.						3.00	
Elco & Tamms, Ill.	Ground silica per ton in carloads—18.00@31.00						
Estill Springs and Sewanee, Tenn.	1.25			1.25		1.35@1.50	
Franklin, Penn.	1.75	1.75		1.75			
Kasota, Minn.							1.00
Kerrs, Ohio	1.10@1.50	1.25@2.00	2.00			2.75@3.00	
Massillon, Ohio	2.25	2.25		2.25	2.50		
Michigan City, Ind.				.30@ .35			
Montoursville, Penn.				1.35@1.50			
New Lexington, O.	2.00	1.25					
Ohlton, Ohio (b)	2.25	2.25	2.50	2.00	1.75	2.25	2.25
Ottawa, Ill.	1.25	1.25	1.25	1.75	1.25	3.50	2.00
Red Wing, Minn. (d)					1.50	3.00	1.50
San Francisco, Calif.[1]	3.50†	5.00†	3.50†	3.50@5.00†	3.50@5.00†	3.50@5.00†	
Silica, Mendota, Va.	Potters flint, 7.00@10.00						
Utica & Ottawa, Ill.	.40@1.00f	40.@1.00f	.75@1.00	.40@1.00f	.60@1.00f	2.23@3.25	1.00@3.25
Utica, Ill.	.60	.70		.75	1.00		
Warwick, Ohio	1.50*@2.00	1.50*@2.00		1.50*@2.00			
Zanesville, Ohio	2.00	1.50	2.00	2.00	2.00		

*Green. †Fresh water washed, steam dried. [1]Core, washed and dried, 2.50. (b) Washed and screened, not dried. (d) Filter sand, 3.00. (e) Filter sand, 3.00@4.25. (f) Crude and dry.

Crushed Slag

City or shipping point	Roofing	¼ in. down	½ in. and less	¾ in. and less	1½ in. and less	2½ in. and less	3 in. and larger
EASTERN:							
Buffalo, N. Y., Erie and Dubois, Pa.	2.25	1.25	1.25	1.35	1.25	1.25	1.25
Eastern Penn.	2.50	1.20	1.50	1.20	1.20	1.20	1.20
Northern N. J.	2.50	1.20	1.50	1.20	1.20	1.20	1.20
Reading, Penn.	2.50	1.25		1.25			
Western Penn.	2.50	1.25	1.50	1.25	1.25	1.25	1.25
CENTRAL:							
Ironton, Ohio	2.05*	1.30*	1.80*	1.45*	1.45*	1.45*	
Jackson, Ohio	2.05*	1.05*	1.80*	1.30*	1.05*	1.30*	
Toledo, Ohio	1.50	1.35	1.35	1.35	1.35	1.35	1.35
SOUTHERN:							
Ashland, Ky.	2.05*	1.45*	1.80*	1.45*	1.45*	1.45*	
Ensley and Alabama City, Ala.	2.05	.80	1.35	1.25	.90	.90	.80
Longdale, Roanoke, Ruesens, Va.	2.50	.75	1.25	1.25	1.25	1.15	1.05
Woodward, Ala.	2.05*	.80*	1.35*	1.25*	.90*	.90*	

*5c per ton discount on terms.

Lime Products (Carload Prices Per Ton F.O.B. Shipping Point)

	Finishing hydrate	Masons' hydrate	Agricultural hydrate	Chemical hydrate	Ground burnt lime, Blk.	Ground burnt lime, Bags	Lump lime, Blk.	Lump lime, Bbl.
EASTERN:								
Berkeley, R. I.			12.00					2.00
Buffalo, N. Y.	11.50	7.50	7.50	12.00	8.00	11.00	7.50	1.50[16]
Lime Ridge, Penn.							5.00[2]	
West Stockbridge, Mass.	12.00	10.00	5.60					2.00[12]
Williamsport, Penn.			8.50@9.00		7.00	8.50[22]	5.00	
York, Penn., & Oranda, Va.	11.50[7]	8.50@9.50[7]	8.50@9.50[7]	8.50@10.50[7]	8.00	9.25	7.00	1.40[8]
CENTRAL:								
Afton, Mich.							7.50	1.35
Carey, Ohio	11.50	7.50	7.50		8.00		8.00	1.50
Cold Springs, Ohio		8.00	8.00				8.00	
Gibsonburg, Ohio	11.50				8.00	10.00		
Huntington, Ind.	11.50	7.50	7.50	12.00	8.00	11.00	7.50	1.50[16]
Luckey, Ohio[6]	11.50							
Milltown, Ind.		8.50@10.00		10.00[8]			8.50[22]	1.35[10]
Ohio points	11.50	7.50	7.50	12.00	8.00	11.00	7.50	1.50[16]
Scioto, Ohio	11.50	7.50	7.50	8.50		.62½	7.50	1.50
Sheboygan, Wis.		10.50					9.50	2.00[4]
Wisconsin points[5]		11.50					9.50	
Woodville, Ohio	11.50	7.50	7.50	12.50	9.00	10.00[9]	9.00	1.50[3]
SOUTHERN:								
El Paso, Texas							7.00	
Frederick, Md.		8.00@9.50	8.00@9.50			9.50[15]	7.00[15]	
Graystone, Ala.	12.50	10.00		12.50		1.40[14]	8.50	1.50
Keystone, Ala.		10.00	8.00	10.00	8.00		8.00	1.50
Knoxville, Tenn.	19.25	8.50	8.50	8.50			7.00	1.25
Ocala, Fla.		10.00	9.00				10.00	1.40
WESTERN:								
Kirtland, N. M.							15.00	
Los Angeles, Calif.	16.00		16.00	16.00			16.00	
San Francisco, Calif.	19.50	16.00	13.00	19.50	14.50	.80	14.50	1.85
Tehachapi, Calif.[13]	17.00	15.00	12.00@15.00[11]	17.00	16.00		16.00	2.00
Seattle, Wash.	19.00	19.00	12.00	19.00	19.00		18.60	2.30

[1] Barrels. [2] Net ton. [3] Wooden, steel 1.70. [4] Steel. [5] 180 lb. [6] Dealers' prices, net 30 days less 25c discount per ton on hydrated lime and 5c per bbl. on lump if paid in 10 days. [7] In paper bags, including bags. [8] To 11.00. [9]80-lb. [10] To 1.50. [11] Refuse or air slack, 10.00@12.00. [12] To 3.00. [13] Delivered in Southern California. [14] Per 2 bags of 90 lb. each. [15] To 8.00. [16] To 1.70. [22] To 9.00. [30] To 16.50.

Miscellaneous Sands

(Continued)

City or shipping point	Roofing Sand	Traction
Utica & Ottawa, Ill.	1.00@ 3.25	.75
Warwick, Ohio		2.00
Zanesville, Ohio		2.50

*Damp.

Talc

Prices given are per ton f.o.b. (in carload lots only), producing plant, or nearest shipping point.

Chatsworth, Ga:	
Crude talc (for grinding)	5.50@50.00
Ground talc (20-50 mesh), bags	5.75@ 7.75
Ground talc (150-200 mesh), bags	6.50@15.50
Pencils and steel crayons, gross	.75@ 2.75
Chester, Vt.:	
Ground talc (150-200 mesh), paper bags	9.00@ 9.50
Same, burlap bags, bags extra	8.00@ 8.50
Chicago and Joliet, Ill.:	
Ground (150-200 mesh), bags	* 30.00
Cromleys Mt., Md.:	
Crude talc	6.00@ 7.00
Dalton, Ga.:	
Crude talc (for grinding)	5 00
Ground talc (150-200 mesh), bags	12.00
Pencils and steel worker's crayons, per gross	1.00@ 2.50
Emeryville, N. Y.:	
(Double air floated) including bags; 325 mesh	14.75
200 mesh	13.75
Glendon, N. C.:	
Ground talc (150-200 mesh), bulk	6.00@10.00
Ground talc (150-200 mesh), bags	8.00@14.00
Pencils and steel crayons, gross	1.05@ 2.00
Blanks, .08 per lb.; cubes	50.00
Hailesboro, N. Y.:	
Ground white talc (double and triple air floated) 200-lb. bags, 300-350-mesh	15.50@20.00
Henry, Va.:	
Crude (mine run)	3.50@ 4.00
Ground talc (150-200 mesh), bags	7.50@14.00
Joliet, Ill.:	
Ground talc (150-200 mesh) in bags: California white	30.00
Southern white	20.00
Dark	10.00
Keeler, Calif.:	
Ground (200-300 mesh), bags	20.00@30.00
Natural Bridge, N. Y.:	
Ground talc (300-325 mesh), bags	12.00@15.00

Rock Phosphate

Prices given are per ton (2240-lb.) f.o.b. producing plant or nearest shipping point.

Lump Rock

Columbia, Tenn.—B.P.L. 65-70%	3.50@ 4.50
Gordonsburg, Tenn.—B.P.L. 65-70%	3.75@ 4.00
Mt. Pleasant, Tenn.—B.P.L. 72%	5.00@ 5.50
Tennessee — F.o.b. mines, gross ton, unground brown rock, B.P.L. 72%	5.00
B.P.L. 75%	6.00
Twomey, Tenn.—B.P.L. 65%, 2000 lb.	8.00@ 9.00

Ground Rock

(2000 lb.)

Centerville, Tenn.—B.P.L. 65%	8.00
Gordonsburg, Tenn.—B.P.L. 65-70%	4.00@ 4.50
Mt. Pleasant, Tenn.—B.P.L. 72%	5.00@ 5.50
Twomey, Tenn.—B.P.L. 65%	8.00@ 9.00

Florida Phosphate

(Raw Land Pebble)
(Per Ton)

Florida — F.o.b mines, gross ton, 68/66% B.P.L., Basis 68%	3.25
70% min. B.P.L., Basis 70%	3.75

Mica

Prices given are net, f.o.b. plant or nearest shipping point.

Pringle, S. D.—Mine run, per ton	125.00
Punch mica, per lb.	.06
Scrap, per ton, carloads	20.00
Rumney Depot, N. H.—Per ton, Mine run	300.00
Clean shop scrap	25.00
Mine scrap	22.50@24.00
Roofing mica	37.50
Punch mica, per lb.	.12

Cut mica—50% from Standard List.

Special Aggregates

Prices are per ton f.o.b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco-chips
Brandon, Vt. — English pink, English cream and coral pink	*12.50	*12.50
Brandon grey	*12.50	*12.50
Brighton, Tenn.— Pink marble chips	§3.00	§3.00
Crown Point, N. Y.— Mica spar	......	9.00@10.00
Easton, Penn.— Green stucco	......	12.00@18.00
Green granite	......	14.00@20.00
Harrisonburg, Va.—Bulk marble (crushed, in bags)	†12.50	†12.50
Ingomar, Ohio—Concrete facings and stucco dash	......	11.00@18.00
Middlebrook, Mo.—Red	......	20.00@25.00
Middlebury, Vt.—Middlebury white	‡9.00	‡9.00
Middlebury and Brandon, Vt.—Caststone, per ton, including bags	......	4.00@ 5.50
Phillipsburg, N. J.— Royal green granite	......	14.00@18.00
Randville, Mich.— Crystalite crushed white marble, bulk	4.00	4.00@ 7.00
Rose pink granite, bulk	......	12.00
Stockton, Calif.—"Natrock" roofing grits	......	12.00@18.00
Tuckahoe, N. Y.—Tuckahoe white	10.00	
Warren, N. H.	......	¶7.90@‖8.95
Wauwatosa, Wis.	......	20.00@32.00
Wellsville, Colo. — Colorado Travertine Stone	15.00	15.00

*Carloads, including bags; L.C.L. 14.50.
†C.L. L.C.L. 16.00.
‡Carloads, including bags; L.C.L. 10.00.
§Bulk, car lots, minimum 30 tons.
¶C.L. ‖L.C.L.

Potash Feldspar

Auburn and Topsham, Me. — Color white, 98% thru 140-mesh	19.00
Buckingham, Ore.—White, analysis, K_2O, 12-13%; Na_2O, 1.75%; bulk	9.00
De Kalb Jct., N. Y.—Color, white, bulk (crude)	9.00
East Hartford, Conn.—Color, white, 40 mesh to 200 mesh	15.00@28.00
East Liverpool, Ohio—Color, white; 98% thru 200 mesh, bulk	19.35
Soda feldspar, crude, bulk, per ton	22.00
Glen Tay Station, Ont.—Color, red or pink; analysis, K_2O, 12.81%; crude	7.00
Keystone, S. D.—White; bulk (crude)	8.00
Los Angeles, Calif.—Color, white; analysis, K_2O, 12.16%; Na_2O, 1.53%; SiO_2, 65.60%; Fe_2O_3, .10%; Al_2O_3, 19.20%; Arizona spar, crude, bags, 13.00; bulk	11.50
Pulverized, 95% thru 200 mesh; bags, 19.73@23.50; bulk	18.43@20.00
Pulverized, 20% thru 80 mesh; bags, 17.60; bulk	16.50
Murphysboro, Ill.—Color, prime white; analysis, K_2O, 12.60%; Na_2O, 2.35%; SiO_2, 63%; Fe_2O_3, .06%; Al_2O_3, 18.20%; 98% thru 200 mesh; bags, 21.00; bulk	20.00
Penland, N. C.—White; crude, bulk	8.00
Ground, bulk	16.50
Spruce Pine, N. C.—Color, white; analysis, K_2O, 10%; Na_2O, 3%; Si_2O, 68%; Fe_2O_3, 0.10%; Al_2O_3, 18%; 99½% thru 200 mesh; bulk. (Bags 15c extra.)	18.00
Tenn. Mills—Color, white; analysis K_2O, 10%; Na_2O_3, 3%; 68% SiO_2; 99½% thru 200 mesh; bulk (Bags, 15c extra)	18.00
Toronto, Can.—Color, flesh; analysis K_2O, 12.75%; Na_2O, 1.96%; crude	7.50@ 8.00

Chicken Grits

Afton, Mich. (Limestone), per ton	1.75
Belfast, Me.—(Limestone), per ton	‡10.00
Brandon, Vt.—Per ton	10.00
Chico and Bridgeport, Tex.—Hen	¶9.00
Baby chick, per ton	¶8.00
Danbury, Conn.; Adams, Ashley Falls, and West Stockbridge, Mass. (Limestone	‡7.50@*9.00
Easton, Penn.—In bags	8.00
El Paso, Tex.—Per ton	1.00
Knoxville, Tenn.—Per bag	1.25
Los Angeles, Calif.—(Feldspar), per ton, including sacks	15.00
Marion, Va.—(Limestone), bulk, 5.00; bagged, 6.50; 100-lb. bag	.50
Middlebury, Vt.—Per ton	10.00
Randville, Mich.—(Marble), bulk	6.00
Rocky Point, Va.—(Limestone), 100-lb. bags, 50c; sacks, per ton, 6.00; bulk	5.00
Seattle, Wash.—(Gypsum), bulk, per ton	10.00
Tuckahoe, N. Y.	8.00
Waukesha, Wis.—(Limestone), per ton	8.00
Wisconsin Points—(Limestone), per ton	15.00

*L.C.L. †Less than 5-ton lots. ‡C.L. ¶100-lb. bags.

Sand-Lime Brick

Prices given per 1000 brick f.o.b. plant or nearest shipping point, unless otherwise noted.

Albany, Ga.	9.00@10.00
Anaheim, Calif.	10.50@11.00
Barton, Wis.	10.50
Boston, Mass.	17.00*
Brighton, N. Y.	19.75*
Brownstone, Penn.	11.00
Dayton, Ohio	12.50@13.50
Detroit, Mich.	13.00@16.00*d
Farmington, Conn.	13.00
Flint, Mich.	18.00†
Grand Rapids, Mich.	13.50
Hartford, Conn.	17.50*
Jackson, Mich.	12.25
Lakeland, Fla.	10.00@11.00
Lake Helen, Fla.	9.00@12.00
Lancaster, N. Y.	12.25
Madison, Wis.	12.50a
Michigan City, Ind.	11.00
Milwaukee, Wis.	13.00*
Minneapolis, Minn.	10.00
New Brighton, Minn.	10.00
Pontiac, Mich.	12.50@15.00*
Portage, Wis.	16.00
Prairie du Chien, Wis.	18.00@22.50
Rochester, N. Y.	19.75
Saginaw, Mich.	13.50b
San Antonio, Texas	16.00
Sebewaing, Mich.	12.50
Sioux Falls, S. Dak.	13.00
South River, N. J.	13.00
Syracuse, N. Y.	18.00@20.00
Toronto, Canada	15.00†
Wilkinson, Fla.	12.00@16.00
Winnipeg, Canada	15.00

*Delivered on job. †5% disc., 10 days. ¶Dealers' price. (a) Less 50c discount per M, 10th of month. (d) 5% disc., 10th of month.

Portland Cement

Prices per bag and per bbl., without bags, net in carload lots.

	Per Bag	Per Bbl.
Albuquerque, N. M.	84¼	3.37
Atlanta, Ga.	......	2.35
Baltimore, Md.	......	2.15‡@2.25
Birmingham, Ala.	......	2.10
Boston, Mass.	......	2.13@2.33
Buffalo, N. Y.	......	2.00‡@2.10
Butte, Mont.	.90¼	3.61
Cedar Rapids, Iowa	......	2.24
Charleston, S. C.	......	2.35
Cheyenne, Wyo.	.64	2.56
Chicago, Ill.	.51¼	2.05
Cincinnati, Ohio	......	2.22
Cleveland, Ohio	......	2.24
Columbus, Ohio	......	2.22
Dallas, Texas	......	2.00
Davenport, Iowa	......	2.24
Dayton, Ohio	......	2.24
Denver, Colo.	.63¾	2.55
Des Moines, Iowa	......	2.05
Detroit, Mich.	......	1.90
Duluth, Minn.	......	2.04
Houston, Texas	......	2.00
Indianapolis, Ind.	.54¾	2.19
Jackson, Miss.	......	2.02
Jacksonville, Fla.	......	2.20
Jersey City, N. J.	......	2.03‡@2.13
Kansas City, Mo.	......	1.92
Los Angeles, Calif.	.60	2.40
Louisville, Ky.	.55½	2.22
Memphis, Tenn.	......	2.04
Milwaukee, Wis.	......	2.20
Minneapolis, Minn.	......	2.12@2.22
Montreal, Que.	......	1.60
New Orleans, La.	......	2.07
New York, N. Y.	......	1.93‡@2.03
Norfolk, Va.	......	2.07
Oklahoma City, Okla.	......	2.46
Omaha, Neb.	......	2.36
Peoria, Ill.	......	2.22
Philadelphia, Penn.	......	2.11‡@2.21
Phoenix, Ariz.	......	3.26
Pittsburgh, Penn.	......	2.04
Portland, Colo.	......	2.80
Portland, Ore.	......	2.40‡@2.60
Reno, Nev.	......	2.91
Richmond, Va.	......	2.24‡@2.40
Salt Lake City, Utah	.70¼	2.81
San Francisco, Calif.	......	2.21
Savannah, Ga.	......	2.50
St. Louis, Mo.	......	1.95
St. Paul, Minn.	......	2.12@2.22
Seattle, Wash.	......	2.60@2.70
Tampa, Fla.	......	2.25
Toledo, Ohio	......	2.20
Topeka, Kan.	......	2.41
Tulsa, Okla.	......	2.33
Wheeling, W. Va.	......	2.12
Winston-Salem, N. C.	......	2.29

Mill prices f.o.b. in carload lots, without bags, to contractors.

	Per Bag	Per Bbl.
Albany, N. Y.	.43¾	1.75
Bellingham, Wash.	......	2.40
Buffington, Ind.	......	1.80
Chattanooga, Tenn.	......	2.45*
Concrete, Wash.	......	2.60
Davenport, Calif.	......	2.45*
Hannibal, Mo.	......	1.90
Hudson, N. Y.	......	1.75
Leeds, Ala.	......	1.65
Lime and Oswego, Ore.	......	2.90‡
Mildred, Kan.	......	2.35
Nazareth, Penn.	......	2.15
Northampton, Penn.	......	1.75
Richard City, Tenn.	......	2.05
Steelton, Minn.	......	1.85
Toledo, Ohio	......	2.20
Universal, Penn.	......	1.80

NOTE—Add 40c per bbl. for bags.
*Includes sacks. ‡10% discount, 15 days.

Gypsum Products—CARLOAD PRICES PER TON AND PER M SQUARE FEET, F.O.B. MILL

	Crushed Rock	Ground Gypsum	Agricultural Gypsum	Stucco Calcined Gypsum	Cement and Gauging Plaster	Wood Fiber	Gauging White	Plaster Sanded	Cement Keene's	Finish Trowel	Plaster Board ¼x32x 36". Per M Sq. Ft.	Plaster Board ⅜x32x 36". Per M Sq. Ft.	Wallboard, ⅜x32 or 48". Lengths 6'-10'. Per M Sq. Ft.
Acme, Tex.	1.70	4.00	4.00	4.00	4.00	4.50	......	......	......	......	......	15.00	20.00
Arden, Nev., and Los Angeles, Calif.	3.00	8.00u	8.00u	10.70u	10.70u	......	......	......	......	11.70u	......	......	......
Blue Rapids, Kan.	1.70	4.00	......	......	......	......	10.00	......	......	......	......	15.00	20.00
Centerville, Iowa	3.00	10.00	15.00	10.00	10.00	10.50	13.50	......	......	13.50	......	......	......
Des Moines, Iowa	3.00	8.00	9.00	10.00	10.00	10.50	13.50	12.00	24.00	22.00	18.00	21.00	30.00
Detroit, Mich.	......	......	......	......	14.30o	12.30m	......	m9.00@11.00o	......	......	......	......	......
Delawanna, N. J.	......	......	......	......	......	......	......	7.25	......	......	13.00	14.00	......
Douglas, Ariz.	......	......	6.00	14.50	15.00	......	18.00	......	30.00	......	......	......	......
Fort Dodge, Iowa	1.70	4.00	6.00	9.00	9.00	9.50	......	......	......	19.00	......	15.00	20.00
Grand Rapids, Mich.	1.70	4.00	6.00	9.00	9.00	9.00	......	......	......	19.00	......	15.00	20.00
Gypsum, Ohio	1.70@3.00	4.00	6.00	7.00@9.00	9.00	9.00	19.00	7.00	24.50	19.00	......	15.00	20.00@25.00
Los Angeles, Calif.	......	......	7.50@9.50	11.50y	......	......	......	......	......	......	......	......	......
Medicine Lodge, Kan.	1.70	4.00	......	......	......	......	......	......	15.00	......	......	15.00	20.00
Port Clinton, Ohio	3.00	4.00	6.00	10.00	9.00	9.00	21.00	7.00	30.15	20.00	......	20.00	30.00
Portland, Colo.	......	......	......	10.00	......	......	......	......	......	......	......	......	......
San Francisco, Calif.	......	......	9.00	13.40	14.40	......	15.40	......	......	......	......	......	......
Seattle, Wash.	6.10	10.50	10.50	......	......	......	......	......	......	......	......	......	......
Sigurd, Utah	......	......	......	......	......	......	......	......	21.50	......	......	......	......
Winnipeg, Man.	5.00	5.00	7.00	13.00	14.00	14.00	......	......	......	......	20.00	25.00	33.00

NOTE—Returnable bags, 10c each; paper bags, 1.00 per ton extra (not returnable). (a) Hardwall plaster, 13.00; casting, finishing, molding, 14.00. (m) Includes paper bags; (o) includes jute sacks; (u) includes sacks; (y) sacks 15c extra, rebated.

Market Prices of Cement Products

Concrete Block

Prices given are net per unit, f.o.b. plant or nearest shipping point

City or shipping point	Sizes 8x8x16	8x10x16	8x12x16
Camden, N. J.	17.00	—	—
Cement City, Mich.		5x8x12—55.00¶	
Columbus, Ohio	16.00	—	—
Detroit, Mich.	.15@ .17†	—	.24@.26†
Forest Park, Ill.	21.00*	—	—
Grand Rapids, Mich.	15.00*	—	—
Graettinger, Iowa	.16@ .18	—	—
Indianapolis, Ind.	.10@ .12a	—	—
Los Angeles, Calif.	4x8x12—5.00*	4x6x12—4.20*	
Oak Park, Ill.	18.00*	23.00*	30.00*
Olivia and Mankato, Minn.	9.50b	—	—
Somerset, Penn.	.18@ .20	—	—
Tiskilwa, Ill.	.16@ .18†	—	—
Yakima, Wash.	20.00*	—	—

*Price per 100 at plant. †Rock or panel face. (a) Face. ‡Delivered. ¶Price per 1000. (b) Per ton. (c) Plain. (d) 5x8x12—65.00 M, 5½x8x12—68.50 M.

Cement Roofing Tile

Prices are net per square, carload lots, f.o.b. nearest shipping point, unless otherwise stated.

Camden and Trenton, N. J.—8x12, per sq.	
Red	15.00
Green	18.00
Chicago, Ill.—Per sq.	20.00
Detroit, Mich.—5x8x12, per M	67.50
Houston, Texas—Roofing Tile, per sq.	25.00
Indianapolis, Ind.—9x15-in.	Per sq.
Gray	10.00
Red	11.00
Green	13.00
Waco, Texas:	Per sq.
4x4	.60
Pasadena, Calif. (Stone Tile):	Per 100
3½x4x12	3.00
3½x6x12	4.00
3½x8x12	5.50
Tiskilwa, Ill.:	Per 100
8x8	15.00
Wildasin Spur, Los Angeles, Calif. (Stone-Tile):	Per 1000
3½x6x12	50.00
3½x8x12	60.00
Prairie du Chien, Wis.:	
5x8x12	82.00
5x4x12	46.00
5x8x 6 (half-tile)	41.00
5x8x10 (fractional)	82.00
	Each
Yakima, Wash. (Building Tile):	
5x8x12	.10

Cement Building Tile

Cement City, Mich.:	Per 100
5x8x12	5.00
Columbus, Ohio:	
5x8x12	6.50
Detroit, Mich.:	
5½x8x12, per M	75.00
Grand Rapids, Mich.:	
5x8x12	8.00
Longview, Wash.:	
4x6x12	5.00
4x8x12	6.25
Mt. Pleasant, N. Y.:	Per 1000
5x8x12	78.00
Houston, Texas:	
5x8x12 (Lightweight)	80.00
	Per 100
Oak Park, Ill. (Haydite):	
4x8x16	15.00
8x8x16	22.00
8x12x16	30.00

Cement Drain Tile

Graettinger, Iowa.—Drain tile, per foot: 5-in., .04½; 6-in., .05½; 8-in., .09; 10-in., .13; 12-in., .17½; 14-in., .25; 16-in., .32; 18-in., .40; 20-in., .50; 24-in., .80; 26-in., 1.00; 28-in., 1.10; 30-in.	1.25
Longview, Wash.—Drain tile, per foot: 3-in., .05; 4-in., .06; 6-in., .10; 8-in., .15; 10-in.	.20
Olivia and Mankato, Minn.—Cement drain tile, per ton	8.00
Tacoma, Wash.—Drain tile, per M:	
3 in.	40.00
4 in.	50.00
6 in.	75.00
8 in.	100.00
Waukesha, Wis.—Drain tile, per ton	8.00

Concrete Brick

Prices given per 1000 brick, f.o.b. plant or nearest shipping point.

	Common	Face
Appleton, Minn.	22.00	25.00@40.00
Baltimore, Md. (Del. according to quantity)	15.50	22.00@50.00
Camden and Trenton, N. J.	17.00	—
Columbus, Ohio	16.00	17.00
El Paso, Tex.—Clinker	11.00	—
Ensley, Ala. ("Slagtex")	14.50	22.50@33.50
Eugene, Ore.	25.00	35.00@75.00
Forest Park, Ill.	—	37.00
Friesland, Wis.	22.00	32.00
Longview, Wash.*	15.00	22.50@65.00
Milwaukee, Wis.	14.00@16.00	19.00@40.00
Mt. Pleasant, N. Y.	—	14.00@ 23.00
Oak Park, Ill.	—	37.00
Omaha, Neb.	18.00	30.00@ 40.00
Pasadena, Calif.	10.00	—
Philadelphia, Penn.	14.75	20.00
Portland, Ore.	17.50	23.00@ 55.00
Mantel brick—100.00@150.00		
Prairie du Chien, Wis.	14.00	22.50@ 25.00
Rapid City, S. D.	18.00	30.00@35.00
Waco, Texas	16.50	32.50@125.00
Watertown, N. Y.	20.00	35.00
Westmoreland Wharves, Penn.	14.75	20.00
Winnipeg, Man.	14.00	22.00
Yakima, Wash.	22.50	—

*40% off List.

Current Prices Cement Pipe

Prices are net per foot f.o.b. cities or nearest shipping point in carload lots unless otherwise noted

Culvert and Sewer	4 in.	6 in.	8 in.	10 in.	12 in.	15 in.	18 in.	20 in.	22 in.	24 in.	27 in.	30 in.	36 in.	42 in.	48 in.	54 in.	60 in.
Detroit, Mich.	15.00 per ton																
Detroit, Mich. (c)																	
Sewer	.10	.12	.22	.30	.40	.60	.90	1.20	—	1.75	2.00	2.50	3.30	4.50	5.75	6.50	8.00
Culvert	—	—	—	—	.95	1.25	1.60	—	—	2.25	2.50	3.00	3.50	5.00	6.50	8.00	10.00
Grand Rapids, Mich.	4 in. to 12 in., 72% off standard sewer price list; 15 in., 65% off; 18 in. to 24 in., 62% off; 27 in. to 36 in., 60% off																
Houston, Texas	—	.19	.28	.43	.55½	.90	1.30	—	1.70†	2.20	—	—	—	—	—	—	—
Indianapolis, Ind. (a)	—	—	—	.75	.85	.90	1.15	—	—	1.60	—	2.50	—	—	—	—	—
Longview, Wash.	Sewer pipe 40% off list; culvert—list																
Mankato, Minn. (b)	—	—	—	—	—	—	—	—	—	1.50	1.75	2.50	3.25	4.25	—	—	—
Newark, N. J.	6 in. to 24 in., $18.00 per ton																
Norfolk, Neb. (b)	—	—	—	.90	1.00	1.13	1.42	—	—	2.11	—	2.75	3.58	—	6.14	—	7.78
Olivia, Mankato, Minn.	12.00 per ton																
Paullina, Iowa‡	—	—	—	—	—	—	—	2.25	—	2.11	—	2.75	3.58	—	6.14	—	7.78
Somerset, Penn.	—	—	—	—	1.08	1.25	1.65	—	—	2.50	—	3.65	4.85	7.50	8.50	—	—
Tiskilwa, Ill. (rein.)	—	—	—	.75	.85	.95	.70	1.55	—	—	—	—	—	—	—	—	—
Tacoma, Wash.	.15	.17	.22½	.30	.40	.55	1.20	1.70	—	2.00	—	2.75	3.40	—	6.50	—	—
Wahoo, Neb. (b)	—	—	—	—	1.00	1.13	1.10	1.60	—	1.90	—	2.25	3.40	—	5.50	—	—
Yakima, Wash.	—	—	—	—	—	—	1.42	—	—	2.11	—	2.75	3.58	4.62	6.14	6.96	7.78

(a) 24-in. lengths. (b) Reinforced. (c) Delivered on job; 5% discount, 10th of month.
†21-in. diam. ‡Price per 2-ft. length.

Traffic Bureau Gets Rate Cut on Crushed Stone

THE SOUTHERN MICHIGAN railway has notified Kenneth Stahl, manager of the Twin City Manufacturers' Traffic Bureau, of an adjustment on rates on crushed stone from Hickory Creek connecting with the Michigan Central railroad at Berrien Springs which will result in a saving estimated at $5000 this year in Berrien county alone.

The company granted the request for a reduction from 30 cents per net ton to 25 cents a net ton.

Increased tonnage expected this year because of the construction of two long county roads, the Shawnee road from Berrien Springs to Baroda and the Range Line road from Berrien Springs to Buchanan, each approximately seven miles long, made the reduction possible, according to the original announcement of the Southern Michigan railway.

It is expected that 1400 cars will be ready to move by May 1. The reduction amounts to approximately $4 on each car.—*Benton Harbor* (Mich.) *News.*

Roofing Slate Recommendation Revised and Now in Effect

A SUFFICIENT NUMBER of written acceptances having been received for Simplified Practice Recommendation No. 14, Roofing Slate, recently revised by the industry, the Division of Simplified Practice of the Department of Commerce announces that the project is now in effect, as of February 1, 1928, subject to annual revision or reaffirmation by the industry.

Eighty per cent of the known manufacturers, distributors and organized users must accept the recommendation in writing before it can be placed in effect by the Department of Commerce.

This recommendation was originally developed January 23, 1924, and has been in effect with satisfactory results since July 1, 1924. A factual survey conducted by the standing committee revealed an average degree of adherence to the recommendation of 98%. This project established a simplified list of 48 items, whereas previously there were 98 items in use.

Progress on New Cement Plant of Ash Grove Company

PROBABLY the biggest industrial enterprise in Nebraska at the present time is the $2,000,000 cement factory being erected at Louisville, Neb., by the Ash Grove Lime and Portland Cement Co.

Officials of the corporation, of which L. T. Sunderland of Kansas City, brother of J. A. Sunderland Brothers Co., Omaha, is president, hope to have it in operation by January 1.

In the first year of its operation they expect to manufacture 1,000,000 bbl. of cement.

The Ash Grove company has 1500 acres of land in its cement-making project. The plant itself and tracks that serve it extend for three-quarters of a mile east of Louisville, Neb., alongside the cliff that contains the limestone which will be the base of the cement to be manufactured.

Rock from the company's quarries and mines will be put into the plant near this farthest end from Louisville. Into the side of the cliff will be built the primary rock crusher. From this first crusher the rock will go into rock storage houses, thence out on conveyors to the mill. From the mill it will go into the rotary kilns, 275 ft. long.

Preparing the site, which was begun in July, 1927, was in itself a big task.

The main line of the Burlington railway ran through land on which the plant was to be located. So the Burlington main line was shunted north towards the Platte river, away from the cliffs.

A high cliff of clay must be removed to make room for the primary rock crusher.

The site chosen for the kilns was a yawning hole, an old limestone quarry. It is almost filled now with sand and silt from the Platte river.

Five miles of railroad tracks have been laid by the cement company for operating the plant.

Already several structures are impressive, from the viewpoint of size.—*Omaha* (Neb.) *Bee-News.*

Asbestos in South Af ica

ROWLAND STARKEY, consulting engineer and general manager of African Asbestos Mining Co., controlled by Turner Bros., of Rochdale, England, who are among the leading asbestos firms of the world, recently returned to Africa after a business trip to North America, in the course of which he visited the famous asbestos mines at Thetford, in Canada. Mr. Starkey, says our South African correspondent, has recently been at New Amianthus mines, in the Eastern Transvaal, and is returning to Shabani, where his company controls the famous Nil Desperandum and other asbestos properties.

At the Amianthus mine a large aerial haulage plant is being installed. This will traverse a distance of six miles from the Amianthus mine to Elandshoek Station. Tenders for the supply and erection of this equipment, which will have a carrying capacity of 7½ tons per hour, are now being called for.

At the Nil Desperandum mine, in Rhodesia, unusually deep from an asbestos point of view, mining operations are in progress. Holman jackhammers are being employed, and the depth attained has necessitated the carrying out of an extensive drainage scheme for the mine. African Asbestos Co. has also acquired extensive interests in the Kuruman district and is undertaking a comprehensive scheme of development there. The asbestos industry in Southern Africa, that is to say in Rhodesia, Transvaal, Cape Province and Bechuanaland, is expanding both in production and general importance. In this expansion African Asbestos Co. has played a highly important part, and the scheme of development which the company has in hand at the present time are calculated to give to that concern an even higher importance and status than this subsidiary of Messrs. Turner Bros. possesses at the present time.—*The Mining World and Engineering Record* (London, England).

Basic Products Cement Plant Doubles Capacity

THE daily capacity of the Kenova, W. Va., plant of the Basic Products Co., for manufacturing cement, will be doubled within the next 30 days, A. T. Wood, general manager, announced recently.

This action is prompted by a marked improvement in business conditions in the Ohio valley district, according to Mr. Wood.

Other plants operated by the company are located at Peebles, Ohio, Lawton, Ky., and Princess, Ky.—*Portsmouth* (Ohio) *Sun.*

Vault Company Leases Cement Products Plant

NEGOTIATIONS for the leasing of the Marani Products plant, Anacortes, Wash., by the Anacortes Burial Vault Co., which have been under way for the past fortnight, have been recently completed and the vault company has begun operations, according to reports. The plant has been leased for a term and an option taken on the purchase of the building. Machinery and molds for the artificial stone burial vaults have been shipped from the east. The cement, lime and high grade sand will be secured on the islands near Anacortes.

The company has the patent and royalty rights for Washington, Oregon and British Columbia from the eastern company, which manufactures on a large scale in eastern and mid-west cities. A crew of 10 to 25 men will be employed at the start.

F. H. Creith, formerly of Pittsburgh, Penn., is manager of the new plant.—*Anacortes* (Wash.) *Mercury Citizen.*

Canadian Asbestos Company's Outlook Is Promising

W. G. ROSS, president of the Asbestos Corp., Ltd., recently declared at the annual meeting the demand for the company's products, especially in the better grades, has taxed capacity and prospects for the coming year are good. He announced that new arrangements have been made for power supply after expiration of existing contracts in 1931 for a period of 30 years, which will effect a saving of approximately 25% in cost.

In answer to a question, he said, that the supply of asbestos is likely to last for another 50 years. The company owns some 30,000 acres of land in the district where the mines are situated, though it is not all asbestos bearing land. The mines now worked occupy only a small portion of the territory owned.

Gravel Plant Forced to Stop Nights and Sundays

WITH numerous complaints received against the operation of sand and gravel plants on the north hill district, Spokane, Wash., nights and on Sundays, the city council recently instructed the commissioner of public safety to enforce the city ordinance forbidding the creation of disturbing noises between 8 p. m. and 6 a. m.

An ordinance passed in 1913 specifically forbids the operation of noise-making industries between these hours. A Sunday-closing ordinance regulates such operations on Sundays.

While the council is empowered to stop operations after 8 p. m., it was felt by the members that special permission might be given to work between 6 a. m. and 10 p. m., enabling the gravel companies to run two full eight-hour shifts.—*Spokane* (Wash.) *Chronicle.*

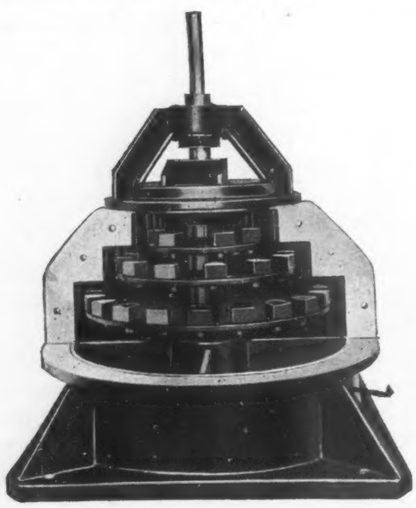
Coyote Blasting Breaks 500,000 Tons of Cement Rock

BY means of the coyote hole method of blasting the Monolith Portland Cement Co., Monolith, Calif., obtained approximately 500,000 tons of rock with a single blast from the quarry at Monolith. The problem constituted loosening the rock from a quarry face of about 350 ft., and coyote blasting was selected as the only feasible method. The entry tunnel was driven in 128 ft. and six lateral tunnels were taken off at right angles. Some 180,000 lb. of dynamite was exploded. No secondary blasting was necessary, as the first blast had broken the rock small enough for the crushers.—*Explosives Engineer* (May, 1928).

New Machinery and Equipment

New Impact Pulverizer

CENTRIPACT PULVERIZER CORP., Denver, Colo., have recently produced a pulverizer of simple design and construction with the object of minimizing wear, decreasing the power demand, and pulverizing the materials to unusual fineness. The pulverizing action combines both impact and attrition, and eliminates rubbing and grinding methods



Impact pulverizer of new and simple design

entirely, according to the manufacturers, thus reducing considerably the wear on the parts and the amount of power consumed.

It will be noted from the illustration that there are three horizontal discs. The top disc has the smallest diameter, while the bottom disc is of largest diameter. Upon each disc are mounted chilled manganese steel hammers which are bolted firmly into a recessed slot in each disc. Opposite each row of hammers is a circular breaker ring which presents a corrugated face toward the hammer.

As the material is fed into the top of the pulverizer, it passes to the center of the first disc. Centrifugal force throws it into the line of hammers, and as the hammers revolve the material is driven against the breaker rings. The rebound of each piece of material is in proportion to its actual size. As it impacts upon the breaker ring there is a shattering effect resulting in a good percentage of fines. These fines are swept down to the center of the second disc. The large pieces which rebound on the first disc are again hit by successive hammer blows until they have been broken into finer material, which passes to the second row. In the same way material will be driven to the second breaker ring, shattered and passed down to the third row. From the third disc it passes to the discharge, which is in the form of a spout beneath. From the above, it can be seen that as each piece of material decreases in size it is struck an increasing hammer blow, due to the larger disc diameter. As the pieces of material rebound, between the breaker rings and the hammers, there is also an action of particle upon particle, which grinds them upon themselves, producing true attrition.

The speed of pulverization is rapid, it is claimed. Fineness of the pulverization depends upon the closeness of the hammers to the breaker rings, together with their speed of rotation. The life of the hammers and breaker rings depends upon the kind of material being pulverized, but the manufacturers claim it to be long due to the special material used. There are no close contacts, ½-in. being the average distance between hammer and breaker rink, and hence no wearing contacts. It is claimed that replacements are seldom necessary, but when they are required, 12 bolts are removed, and a side of the pulverizer easily removed. This work of replacement can be done in an hour, the manufacturers say.

According to the producers claims, the Centripact pulverizer, without air separation, has pulverized damp bituminous coal 90% through 300-mesh, has pulverized the hardest flint rock from 1½-in. down to 85% through 200-mesh and also pulverized mica, damp clay, cast-iron chips, shellacs, all kinds of iron ores, oxides, pigments, etc.

The manufacturers claim that this machine will pulverize practically every material, producing an exceedingly large tonnage at a very low cost for power and replacement.

The Centripact pulverizer is distributed throughout the entire east by George F. Pettinos of Philadelphia, Penn.

Wisconsin Manufacturer Takes Over Production of Crane

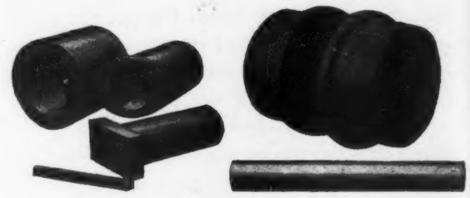
THE Manitowoc Engineering Works, a division of the Manitowoc Shipbuilding Corp., Manitowoc, Wis., has announced that it has taken over the manufacture of the Moore speed crane. This arrangement was recently effected with the Moore Speed Crane Co., Chicago, who continue as sales representatives in Chicago for Manitowoc. In New York City the authorized sales agents for Manitowoc are Forsythe Bros., 30 Church street. An extensive manufacturing program on the Moore speed crane is planned through the use of the extensive manufacturing facilities of the Manitowoc company.

Manganese Steel Parts for Crawler Equipment

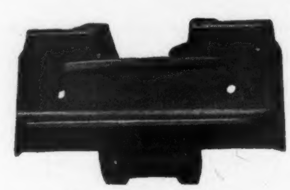
THE American Manganese Steel Co., Chicago, has developed a number of specially designed crawler parts for cranes, tractors, shovels, trenchers and excavators. These parts are of manganese steel and are designed to meet the severe service to which the above-mentioned machines are subjected. They are interchangeable with original equipment, or will fit into any part now being used, the manufacturers claim. It is claimed

Sprocket wheel

Front idler



Rollers, bushings pins and upper track rollers



Crawler treads

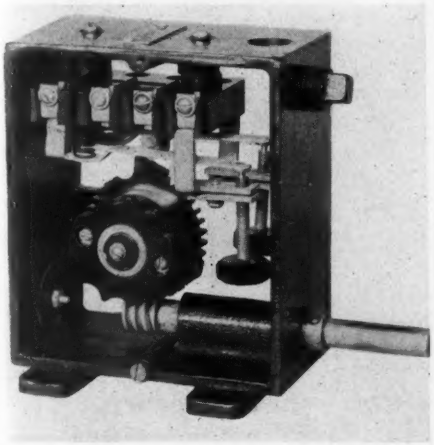
that the new parts will resist wear and will stand up under the shocks of metal-to-metal contact and abrasive conditions.

The parts include one-piece crawler treads, rollers, bushings, pins, hunting tooth split-rim sprocket wheels, split-rim self-cleaning sprocket wheels, front idlers, upper-track rollers, double-flanged lower rollers and single-flanged lower rollers.

These developments round out the line of manganese steel parts which the company is manufacturing for nearly all types of contractors' and industrial equipment, it is said. The company claims that when ultimate service is considered, these parts are moderate in cost, and will outlast ordinary steel many times.

New Limit Switch for Control Circuits

THE GENERAL ELECTRIC CO., Schenectady, N. Y., announces a new design of limit switch, furnishing a simple, reliable means for controlling the limits of travel on such applications as motor-operated window- or door-opening apparatus, valves, etc., where magnetic control is used. This



Limit switch for magnetic control circuits

switch has been given the General Electric designation CR-9441-LS-424-A. The switch is provided with two normally-closed contacts, one for each extreme of travel. These contacts are operated by two cams mounted on opposite faces of a molded gear. The two cams are adjustable with respect to each other and, as a further refinement, each contact has a micrometer screw which makes possible very close adjustment of the opening point for each contact after the general position of the cams has been set. The molded gear, with the two cams, is driven by means of a worm gear. The entire mechanism is enclosed in a cast-iron box with sheet-steel covers on the front and back. Contacts are both of silver, thus insuring good contact regardless of oxidation, since silver oxide is a good conductor.

The manufacturers claim that no tools are required for adjustment, and accurate fixing of the points at which the two cams will open their respective contacts is simple. One cam is fastened to one face of the molded gear by means of two screws, and the second cam is provided with two pins which fit into two holes in the face of the molded gear. The face of the molded gear against which this cam rests has a series of these small holes drilled around the entire circumference, so that the adjustable cam can be moved to a large number of positions.

The switch is provided with two threaded conduit openings which allow conduit to be run to it. Terminals are provided on a molded base, these being all on the same side of the switch and providing for the leads that are to be wired to it. Protection from live parts when making adjustments on the switch is insured by the use of molded insulation parts, the company claims, thus making the switch suitable for use even by inexperienced operators, it is said.

New Four-Ton Gasoline Locomotive

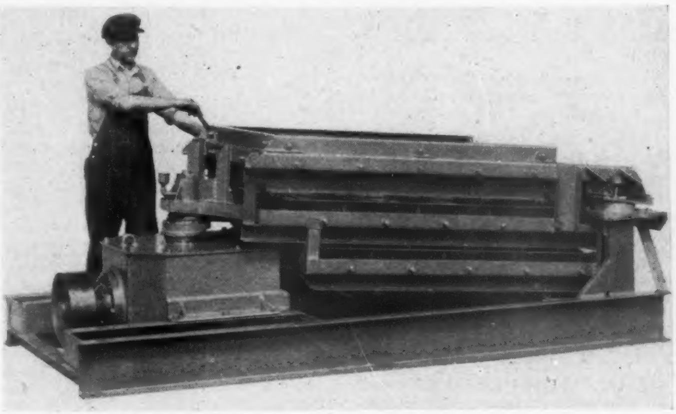
THE Brookville Locomotive Co., Brookville, Penn., has recently announced a new 4-ton model gasoline locomotive suitable for use at lime plants, quarries and similar operations. As in the larger Brookville models, this new locomotive is driven by a McCormick - Deering industrial tractor unit, manufactured by the International Harvester Co. of Chicago. The Brookville company claims that no mutilation of the 10-20 tractor unit has been made in its installation as a power unit for the locomotive, and hence it is claimed that the new model "1-BS" has all the reliability of the McCormick-Deering tractor. Service, parts and repairs for the locomotive can thus be had at International Harvester Co. agencies.

The motive power is a vertical, four-cylinder, valve-in-head engine, having the working parts protected from dust and dirt. The rated S.A.E. horsepower is 28.9, and the engine speed is 1000 r.p.m. The locomotive developes a drawbar pull of 2000 lb. The unit is available for gages from standard down to 22 in., and can be special built for gages smaller than 22 in. The locomotive has three forward speeds and three reverse. The wheelbase is 42 in. but can be ordered less, with a minimum of 36 in.

New Three-Deck Screen

THE Orville Simpson Co. of Cincinnati, Ohio, have recently brought out a new three-deck, heavy-duty "Rotex" screen, known as No. 22. In the new screen, each surface measures 3 ft. by 5 ft., and the decks are staggered, with the lower surfaces beyond the upper, so that each surface is fully loaded.

The company says that two features, accessibility and visibility, hav been given careful consideration in designing the new screen. Each screen cloth may be inserted or removed from either side without disturbing the adjacent cloths, it is claimed, and the whole of all three surfaces is observable through either side. In general construction of the new screen follows the company's single- and double-deck screens.



New triple-deck heavy duty screen

Railway Supply Concern Enlarges

THE Morrison Railway Supply Corp. of Buffalo, N. Y., has purchased the railway track material business formerly conducted by Morrison and Risman Co., Inc. The later company had been established for more than 40 years. The Morrison Railway Supply Corp. operates plants and warehouses at Chicago, Indianapolis, Pittsburgh, Harrisburg and Buffalo and general offices at Buffalo.

Four-ton gasoline locomotive in operation at the Bruns Hydrated Lime Co., Woodville, Ohio

News of All the Industry

Incorporations

Southern Quarries Co., Wilmington, Del., 100,000 shares common.

Burton Cast Stone Co., Tampa, Fla., incorporated; F. B. Burton.

Guaranteed Concrete Block Co., Plainfield, N. Y.; C. C. Reina of Plainfield.

Gulf Gravel Co., Houston, Texas, changing name to Saxte Sand and Gravel Co.

Arrowhead Sand and Gravel Co., Plattin, Mo.; William P. Carmichael, St. Louis.

Cobleskill Limestone Products Corp., Cobleskill, N. Y., capital $600,000 to $200,000.

Seaford Sand and Gravel Corp., Seaford, N. Y., $12,000. P. J. McDonald, Manhattan.

Cumberland Sand and Gravel Co., Sheronville, Ohio, 200 shares nop ar value; M. Parker.

Cement Products Co., Renton, Wash., capital $15,000; increasing capital stock to $75,000.

Franklin Sand and Cement Products Co., Inc., Ridgewood, N. Y., 125,000 shares common.

Receptacle Mold Corp., Detroit, Mich., capital stock $50,000, to manufacture concrete molds and parts.

Limestone Service Co., Centerville, Ohio, 250 shares no par value; W. C. Burns, E. W. Ellis, L. A. Elliot.

Eugene Sand and Gravel Co., Salem, Ore., capital stock $100,000. J. R. McKay, H. B. Ruth and H. Platt.

White Rock Silica Co., Chicago, Ill., capital $50,000. Mine, purify and dispose of silica, oil, lead, silver, blackjack, etc.

Standard Lime and Plaster Co., Portland, Ore., capital stock $300,000. D. N. Littler, W. D. McMillan and Harry Dayton.

American Potash Co., Dallas, Texas, 10,000,000 shares non-par value investment company. J. N. Stier, J. B. Adoue, Jr., and H. R. Mitchell.

Stone, Sand and Gravel Co., Dayton, Ohio, 250 shares at no par value; Morris Stone, Mary Stone and A. Rowinsky.

M. S. and B. Sand and Gravel Co., Inc., Wallington, N. J., $100,000. Jacob Miller, Rutherford; John Stock, Clifton, and Max O. Bloom, Wallington.

Cheektowaya Crushed Stone Corp., Cheektowaga, N. Y., capital stock $250,000. M. Kyler, Tonawanda; S. F. Clough, Syracuse; H. M. McNab, Kenmore.

New River Lime Co., Ripplemead, Va., capital $5,000-$25,000. Manufacture and sell chemical, agricultural and manufacturing lime. Bernard Mason, Clay Mason and Kitty Mason.

Havlik Stone Co., Chicago, Ill., 1000 shares non par value. Manufacture and deal, cast stone, artificial stone, cinder blocks, etc. S. E. Hurley, E. L. Harding, J. O. C. Fitzgerald, M. Thomson, Jr., and C. A. Spiess.

Quarries

Universal Granite Quarries Co. announce the removal of their offices to the Conway Bldg., Chicago, Ill.

Saluda Crushed Stone Co., Hellams, 14 miles from Greenville, S. C., was recently damaged by fire to the extent of about $200,000.

Kelley Island Lime and Transport Co.'s plant at Tiffin, Ohio, was damaged by fire when a group of buildings burned recently.

Schneider Bros., Lancaster, Wis., recently placed a large rock crusher outfit, operated by gasoline, on location near Lancaster.

Bethany, Mo. Lack of funds may prevent the city quarry at Bethany, recently opened, from operating as expected.

Kelley Butte Quarry, Multnomah County, Ore. About 45 county jail prisoners are being used in putting quarry into shape for road work use.

Ustick Limestone Association, Cottonwood, Iowa, recently held a directors' meeting at which operating plans were discussed for the coming season.

Fish Pond of Abandoned Quarry. A 3½-acre abandoned quarry near West Milgrove, Ohio, was recently purchased by the Montgomery Township Izaak Walton League. The state of Ohio will stock the quarry with fish.

Dolomite, Inc., Cleveland, Ohio, fired the fourth large blast at its Maple Grove, Ohio, stone quarry. Nearly a carload of dynamite was used. The blasts were designed to open a new level in the floor of the quarry.

Thomas Crouse, of Croyden, Iowa, is to build a crushing plant at Princeton, Mo., according to local papers. They report that contracts for railroad ballast and highway material have been secured which will take several hundred tons per day from the new plant.

City Cannot Fence Quarry. The city attorney for Minneapolis, Minn., stated that the city had no right to fence in an abandoned stone quarry in Minneapolis in which a man was recently drowned because the city has no authority to order fencing on private property.

Sand and Gravel

John Karch Stone Co., Celina, Ohio, recently acquired the Smith and Baker gravel pit at New Corydon, Ohio.

Looney and Saxton Co., Salem, Ore., are prospecting the Abiqua river, Oregon, for the location of a gravel bar on which to place a dredge.

Shirley, Ill. Farmers, with a homemade chain drag outfit, are co-operatively getting out gravel for road work near Shirley.

Kirkland Sand Gravel Co., Kirkland, Wash., have recently added a 3½-ton motor truck to their equipment, for use in making local deliveries.

Ideal Sand and Gravel Co. recently started up its plant near Mason City, Iowa, and is reported running to capacity.

F. F. Ziegler, Junction City, Kan., has formed a company to test a sand excavating device invented by Mike Schmidt. It will be tried out in Smoky Hill river.

L. C. Everest Co.'s new plant near Hawarden, Iowa, is near readiness for operation. The plant is of all steel construction and has a maximum capacity of about 40 cars per day.

Lehigh Sand and Gravel Co. Salisbury township, Pennsylvania, is engaged in enlarging its plant to five times its present capacity. It is planned to have the new units in operation by the first of June.

Brazil Sand and Gravel Co., Brazil, Ind., is installing machinery for taking gravel from the Eel river near Brazil. The material will be graded for road and construction use.

Grant Smith and Co.'s plant near Edgar, Mont., has expanded its business to include commercial production for all construction purposes. Activities were formerly confined to supplying ballast material for the Northern Pacific and Burlington railroad.

F. W. Benecke, Bloomington, Ill., owner and operator, recently opened a new gravel pit near Bloomington. The new company will handle sand and gravel, concrete blocks, etc. A modernly equipped plant for washing and screening gravel has been installed.

Lyman Richey Sand and Gravel Co., Omaha, Neb., which operates a number of plants in Nebraska, recently opened new pits near Plattsmouth, Neb. Local papers say that 100 cars a day are being shipped from the two new plants that have been erected there.

Cement

Sandusky Cement Co., Cleveland, Ohio, has removed its Dixon, Ill., sales offices to Chicago.

West Penn Cement Co.'s new plant at West Winfield, Penn., is reported, will soon begin operations.

Lawrence Portland Cement Co. shipped the first trainload from the new plant at Thomaston, Me., on May 14.

Marble Valley Stone Quarry's cement plant near Rolfe, Iowa, is reported, will soon begin operations manufacturing cement.

The Northwestern States Portland Cement Co., Mason City, Iowa, recently purchased the Gilmore portland cement plant and preparing for immediate opening of the plant.

Pacific Coast Cement Co., Seattle, Wash., is offering a free round trip ticket to Alaska to the individual who selects the best name for the first of the two steel steamships to enter the service of the Pacific Coast Steamship Co. in transporting limerock from Dall Island, Alaska, to the million-barrel capacity plant under construction in Seattle.

Alpha Portland Cement Co. dedicated the safety trophy won in 1927, by its plant at Ironton, Ohio, on May 10. There were appropriate ceremonies and a banquet. G. S. Brown, president of the Alpha company was the principal speaker at the dedication exercises.

Cement Products

Texas Concrete Pipe Co., Houston, Texas, was recently damaged by fire.

Artificial Stone Co., Wilmington, Del., has built a new 60x30-ft. building to house its machinery. The upper floor will be used for storage.

Art Concrete Co., Pasadena, Calif., has recently established a Jacksonville, Fla., plant for the manufacture of meter boxes.

Cement Products Co., Renton, Wash., is constructing a new building to replace one damaged by fire recently.

North Dakota Concrete Products Co., Elk River, Minn., has begun construction of a concrete products plant in Minot, N. D.

Webb Tank and Tile Co., Baton Rouge, La., is in the market for equipment for the manufacture of concrete pipe.

B. H. Grove, Sacramento, Calif., has recently taken over the management of plant No. 4 of the United Concrete Pipe and Construction Co. in Woodland, Calif.

Lime

Western Lime and Cement Co.'s plant at Walders, Wis., was damaged by fire recently.

Marianna Lime Products Co., Marianna, Fla., are reported, will begin operations on property they have leased at White Cliffs, Fla.

Eagle Rock Lime Co., Eagle Rock, Va., has recently installed a modern rock crusher at its quarry on the outskirts of Eagle Rock.

National Lime and Stone Co., Findley, Ohio, plans to establish a distributing branch in Akron, Ohio, calling for an outlay in excess of $75,000.

Gypsum

Best Bros. Keene's Cement Co., Medicine Lodge, Kan., is taking bids on construction of 80x100 ft. reinforced concrete building.

Miscellaneous Rock Products

Southern States Phosphate Co., Baltimore, Md., is rebuilding a building damaged by fire.

American Potash Co., Dallas, Texas, a recently chartered company, plans to start mining and refining at an early date, formations in Midland, Ecter and Upton counties, which are known to contain potash. The concern is the first to be chartered for potash mining in Texas.

Personals

H. R. Sykes, Cincinnati, Ohio, recently became manager of sales of the locomotive division of the Cincinnati Car Co.

J. J. Oaks, formerly in charge of the International Cement Corp. plants in South America, has been recently selected as superintendent of the Indiana Portland Cement Co., Green Castle, Ind.

Frank Pollock, Eveleth, Minn., former safety director of the Oliver Iron Mining Co. in the district, has been recently appointed quarry superintendent for the Fort Dodge plant of the United States Gypsum Co.

Fred E. Caldwell, formerly vice-president and general manager of the Springfield Sand and Tile Co., Springfield, Mass., has been recently appointed service manager for the Keystone Portland Cement Co., Allentown, Penn.

Royal C. Wise, Chicago representative for four pump and compressor manufacturers, has announced the removal of his office to the Oxford building at 118 North La Salle street. Mr. Wise represents the American Air Compressor Works, the Erie Pump and Engine Works, the Wagener Steam Pump Co. and the Frank J. Kimball Co.

H. D. Savage, for many years vice-president of the Combustion Engineering Corp., an American subsidiary of the International Combustion Engineering Corp., has been named president of that corporation to succeed Joseph V. Santry, who has resigned. Mr. Savage has had a long and varied experience in the manufacture and sale of power plant equipment. He is also president of the Dry Quenching Equipment Corp., president of the Combustion Engineering Corp., Ltd., of Canada, vice-president of the Ladd Water Tube Boiler Co. and vice-president of the Raymond Bros. Impact Pulverizer Co. **George T. Ladd** has been elected vice-chairman of the board of directors of the Combustion Engineering Corp. He is also president of the Ladd Water Tube Boiler Co. and president of the Heine Boiler Co.

Obituaries

Ernest E. Northup, superintendent of the Independent Gravel Co., Carthage, Mo., died April 27, 1928, at the Carthage hospital following an illness of several years duration. Mr. Northup was 50 years old.

Stephen J. Hayde, inventor of Haydite, died May 12, 1928, on a train while en route from Montreal for Kansas City. He had been in Montreal relative to the establishment of Haydite factories there. Mr. Hayde was 64 years old.

Manufacturers

Fairfield Engineering Co., Marion, Ohio, announces the appointment of Earl D. Stearns, formerly of the Stearns Conveyor Corp., Cleveland, to their company in the capacity of vice-president.

Earl D. Stearns

Marion Steam Shovel Co. has moved its Chicago office to the McCormick Bldg., 332 S. Michigan Ave.

General Electric Co. announce the retirement of Theodore Beran, commercial vice-president in charge of the New York district.

Ingersoll-Rand Drill Co., 314 North Broadway, St. Louis, Mo., announce that they have been succeeded by Ingersoll-Rand, Inc.

Hendrick Manufacturing Co., Carbondale, Penn., announces th return to his offices of its president, L. A. Bassett, after an absence of several months.

Rollway Bearing Co., Inc., Syracuse, N. Y., announces the appointment of Alfred E. Munch, Jr., as representative in the Chicago-Milwaukee district, with headquarters in the Railway Exchange Bldg., Chicago.

National Flue Cleaner Co., Inc., Groveville, N. J., announces the recent appointment of the following representatives: Walter G. Hancock, 30 Euclid Arcade, Cleveland, O., 413 Penobscot Bldg., Detroit, Mich.; John Deerwester Co., 1621 University Ave., St. Paul, Minn.; Charles Zinram, P. O. Box 487, Erie, Penn.; Laib Co., Louisville, Ky.

Allis-Chalmers Mfg. Co., Milwaukee, Wis., has moved its Grand Rapids, Mich., branch office to the Building and Loan building. The office is in charge of G. C. Culver.

Robinson Mfg. Co., Pittsburgh, Penn., has recently bought out the Gedge-Gray Co., Lockland, Ohio, manufacturers of Gardner sifters and mixers, and will continue to manufacture the complete line.

H. K. Porter Co., Pittsburgh, Penn., announces the removal of its Chicago office from the Monadnock building to the new Engineering building. George Kirtley, district manager, remains in charge of the office.

Wagner Electric Corp., St. Louis, Mo., announces the recent election of C. P. Potter, engineer in charge of Large Motor and Transformer Divisions, to chairman of the St. Louis Section of the A. I. E. E.

General Electric Co. announces the appointment of C. W. Stone, manager of the General Electric Central Station Department, to the position of consulting engineer, and the selection of M. O. Troy as manager of the Central Station Department.

Linde Air Products Co., New York City, have opened a new district sales office at 48 West McLenmore avenue, Memphis, Tenn., to serve western Tennessee, northern Mississippi and eastern Arkansas. H. M. Smith will be in charge as district manager.

American Hoist and Derrick Co., St. Paul, Minn., announce the withdrawal of W. O. Washburn. Frank J. Johnson, the senior partner, purchased Mr. Washburn's partnership interest. The business will continue under the same name in the form of a corporation.

Ingersoll-Rand Co., New York City, has added a seventh size to its line of portable air compressors. This new size (4¾-in. bore by 4-in. stroke) has a piston displacement of 82 cu. ft. per minute. It is intended primarily for use by those requiring a unit of slightly larger capacity than the 4¼x4-in. 66-cu. ft. machine.

The Chain Belt Co., Milwaukee, Wis., has elected Robert W. Baird, Milwaukee banker, a director to fill the vacancy caused by the death of H. O. Seymour. Mr. Baird is vice-president of the First Wisconsin National Bank, president of the First Wisconsin Co., and vice-president of the First Wisconsin Trust Co.

Ohio Power Shovel Co., Lima, Ohio, announces the opening of an office at 30 Church street, New York City, with L. H. Morris in charge, another office at 1119 South 56th street, Philadelphia, with E. E. Fort in charge, and also a Chicago office in the Straus building, with H. P. Steinbrenner in charge.

Foote Bros. Gear and Machine Co., Chicago, Ill., has appointed Woodbury and Wheeler, 55 second street, Portland, Ore., as representatives in Portland and vicinity. Cunningham Electric Co., 2123 Pacific avenue, Tacoma, Wash., have been appointed Foote representatives for Tacoma and vicinity.

Magnetic Mfg. Co., Milwaukee, Wis., has appointed J. H. Phinney as exclusive representative for the eastern part of Michigan, with headquarters at 420 U. S. Mortgage building, Detroit. Mr. Phinney has had nearly 20 years experience in sales work on equipment allied to the company's line of magnetic clutches and magnetic separation equipment.

General Electric Co., Schenectady, N. Y., at its stockholders meeting on May 8 re-elected the present officers and directors of the company. The board of directors was increased to 21 members and Henry C. McEldowney, president of the Union Savings Bank and Union Trust Co., both of Pittsburgh, was elected as the additional member.

B. F. Goodrich Co., New York City, has elected James D. Tew, formerly first vice-president, to the position of president, to succeed Harry Hough, who has resigned. Mr. Hough, who was elected president last September to succeed the late B. G. Work, will retain his position as a member of the board of directors and will act in an advisory capacity. Mr. Tew has been with the Goodrich company since 1906 and in 1927 was elected first vice-president. A few months later he was also made general sales manager.

International Combustion Engineering Corp., New York City, announces the appointment of Hans J. Meyer as an engineer of the foreign department of the corporation. Mr. Meyer has had a wide experience as an engineer and an executive, including work as the administration engineer for the U. S. Fuel Administration, Bureau of Conservation, during the World War. He was also in charge of design and construction of the Kip's Bay station of the New York Steam Corp., believed to be the largest steam-heating plant in the world. Mr. Meyer will sail for the Orient on June 6.

Wagner Electric Corp., St. Louis, Mo., announces the appointment of E. D. Pike as manager of its San Francisco branch office. Mr. Pike has been with the Wagner corporation for 26 years, and recently has been in charge of the Pacific coast service operation.

Sprout, Waldron and Co., Muncy, Penn., manufacturer of transmission and material handling equipment, has added to its sales force David E. Smythe, formerly with the Fairbanks-Morse Co., E. Harold Neeley, formerly with Royersford Foundry and Machine Co., and J. W. Ryan, recently with Brown and Sharp.

The Manganese Steel Forge Co., manufacturers of "Rol-man" manganese-steel screens and other products of forged manganese steel, has moved its Chicago office from the Old Colony building, Dearborn street and Jackson boulevard, to the new Builders' building, Wacker drive and La Salle street. W. H. Potter is western manager at Chicago.

Continental Motors Corp., Detroit, Mich., has commenced the production of a series of six-cylinder, overhead valve engines, intended exclusively for truck and bus service. The corporation claims to have developed an engine of marked smoothness, quietness, durability, economy, accessibility and long-life. Cylinders are 4⅛-in. bore and 4¾-in. stroke, with a displacement of 381 in. The engine develops 87 hp. at 2400 r.p.m.

Bayley Blower Co., Milwaukee, Wis., announces the promotion of Charles H. Jackson, formerly chief engineer, to the position of general sales engineer. The appointment of Ernest Szekely as chief engineer has also been announced. Mr. Szekely is a graduate of the University of Budapest, where he was associate professor of mechanical and electrical engineer, and has been research engineer for the American Blower Co., chief engineer for the Drying Systems and later a consulting engineer in Cleveland, Ohio.

Roller Bearing Co. of America, Newark, N. J., has just completed the purchase of the large plant of the Mercer Motor Car Co. at Trenton, N. J., and will install its present equipment in that plant together with considerable new equipment which is necessary to take care of the expanding business. The company has occupied a plant in Newark, N. J., since 1919, but now finds this plant too small for its needs. The new plant occupies 11½ acres, and the buildings have 175,000 sq. ft. of floor space, and are all of modern mill-type construction. The property is adjacent to the main line of the Pennsylvania railroad and is served by sidings on two sides.

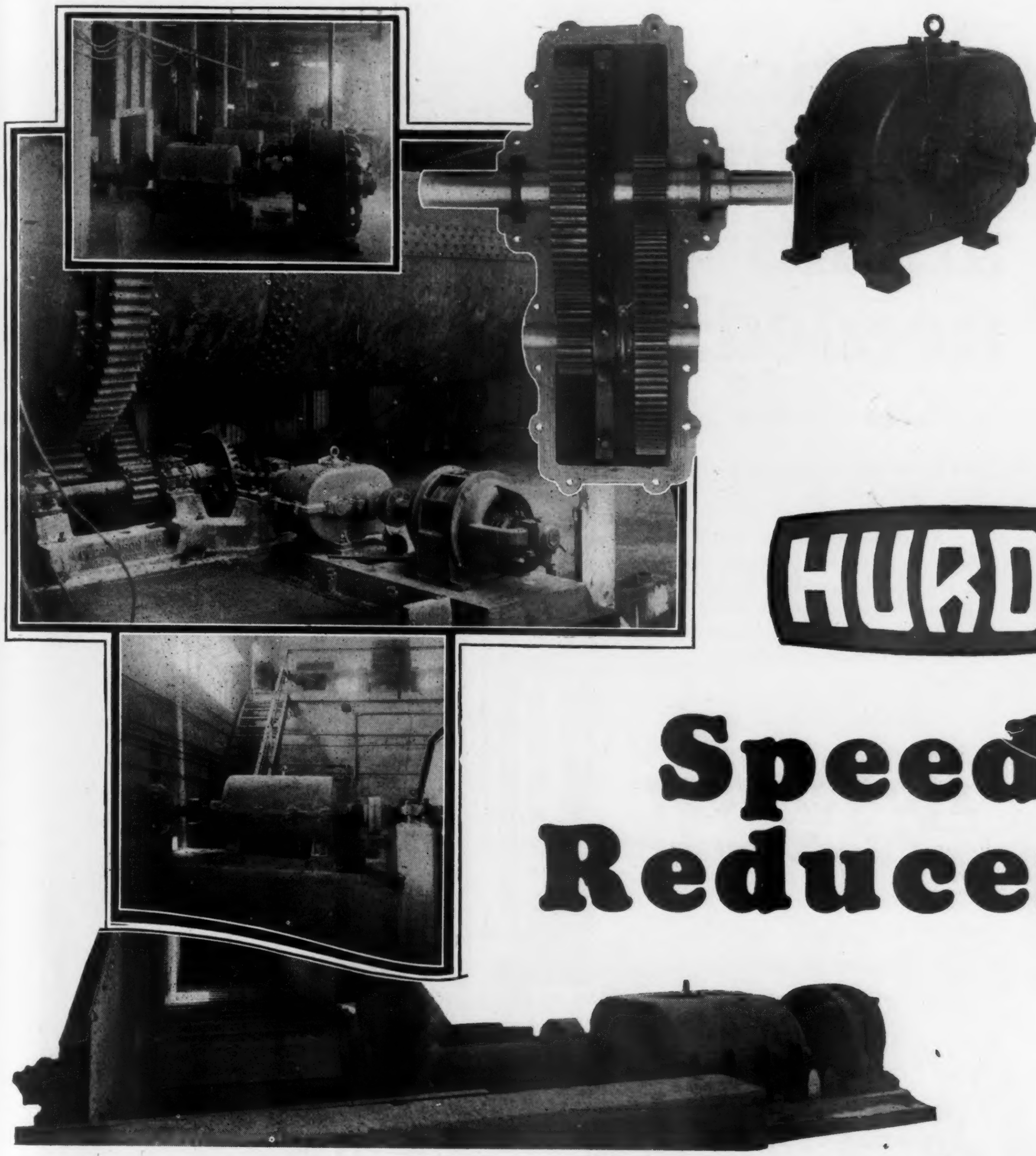
Trade Literature

NOTICE—Any publication mentioned under this heading will be sent free unless otherwise noted, to readers, on request to the firm issuing the publication. When writing for any of the items kindly mention ROCK PRODUCTS.

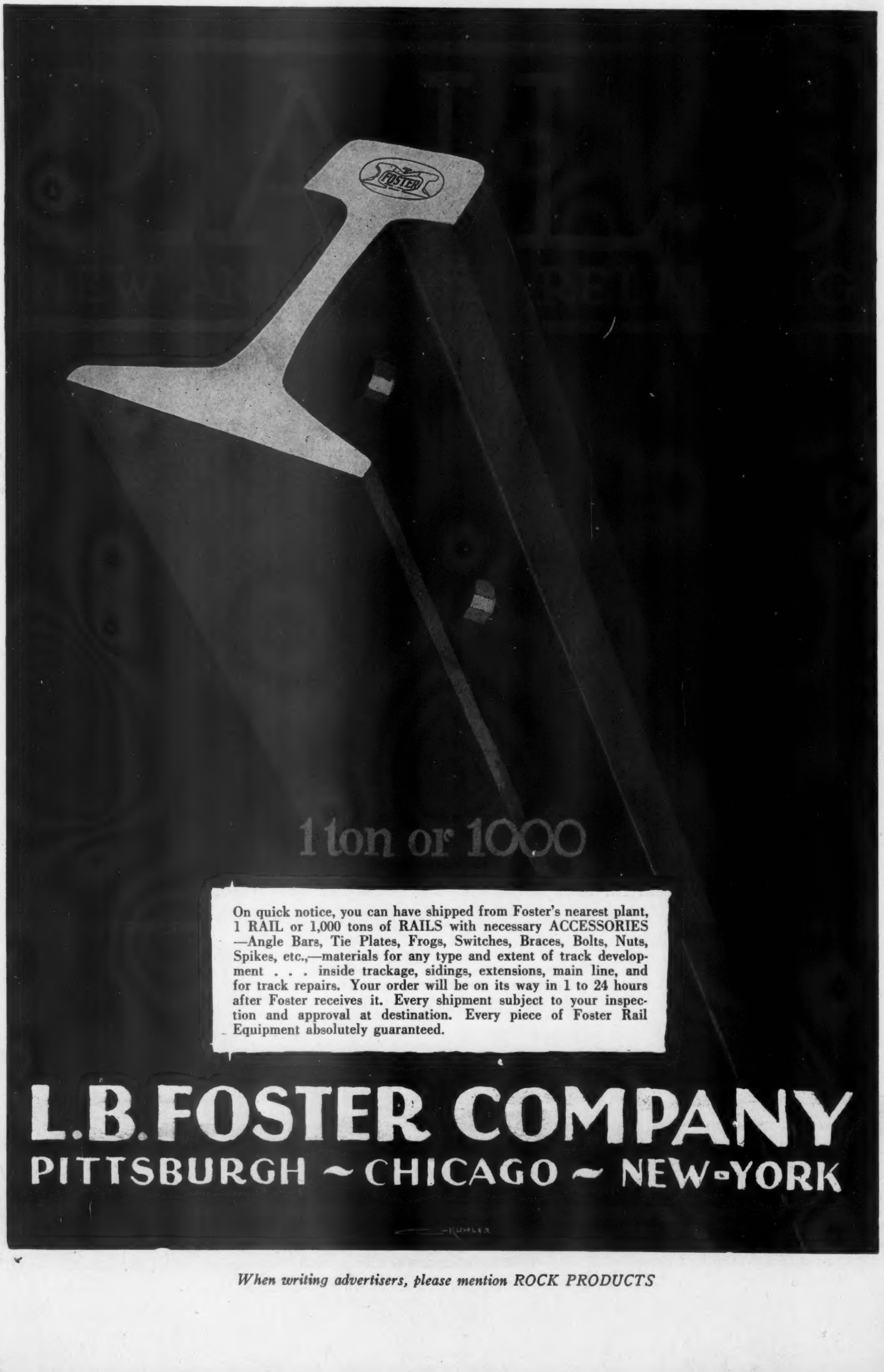
Mechanical Gas Producer. Bulletin No. 85. A 48-page illustrated catalog on the W-S-M type L mechanical gas producer, showing blueprints, charts, views, cross-sections and installations. Numerous tables giving operating and other data are included in the bulletin. WELLMAN-SEAVER-MORGAN CO., Cleveland, Ohio.

G. E. Bulletin. GEA-752. Illustrated bulletin on Type BD, direct-current motors. **GEA-865.** Bulletin on squirrel-cage and wound-rotor multi-speed induction motors. **GEA-874.** Bulletin on Type WD-200A arc welder, driven by belt, motor or gas-engine. **GEA-881.** Bulletin on Type WD-200A arc welder driven by gas engine. **GEA-894.** Announcement of adjustable-speed direct-current motors, Type CO. **GEA-934.** Bulletin on CR-7896 automatic throw-over panels. **GEA-948.** Bulletin on CR-4065 direct-current magnetic controllers. **GEA-949.** Announcement of CR-2904 temperature overload relay panels. **GEA-950.** Bulletin on CR-1028 a.c. enclosed starting rheostats. **GEA-980.** Enclosed speed-regulating rheostats. **GEA-197A.** Bulletin of mechanical drive turbines, Type D-54. **GEA-308A.** Bulletin on arc suppression plates for drum controllers. **GEA-468A.** Drum-type controllers for use with direct-current, adjustable-speed motors. **GEA-569A.** Constant-potential arc welding sets. **GEA-588A.** Centrifugal air compressors, geared units. **GEA-724A.** Totally-enclosed, fan-cooled induction motors, "900 series" frames. **GEA-743A.** Drum controllers for two-phase or three-phase slip-ring induction motors. **GEA-823A.** Atomic-hydrogen arm welding equipment. **GEA-835A.** D.C. magnetic controllers for constant and adjustable-speed motors. **GEA-233B.** Centrifugal air compressors, single-stage. **GEA-360B.** Remote-indicating speed controller for a.c. slip-ring induction motors. **GEA-383B.** Low-speed syrchronous generators, "6000 series," large sizes. **GEA-190.** A.C. enclosed magnetic switches.

Indicating, Recording and Controlling Thermometers and Gages. A folder, illustrating the application of their recording thermometers and gages is offered by the BROWN INSTRUMENT CO., Philadelphia, Penn.




Practically
no oiling
attention
needed —
A satisfied user of our crusher out in Ventura California tells us that he fills the crankcase of the Roller-bear only once each six weeks — he has two other crushers at his plant that require oiling each two hours — but the roller-bear does twice the capacity of either crusher — figure that one out in the book of costs and overhead — Send for catalog — it may mean thousands of dollars in profits to you.
Roller-bear
TRADE MARK
Rock Crusher
ALLOY STEEL AND METALS COMPANY
OF CALIFORNIA INC.
55th and Alameda St.
LOS ANGELES
Box 840 Arcade Station
CALIFORNIA


FOSTER
1 ton or 1000
On quick notice, you can have shipped from Foster's nearest plant, 1 RAIL or 1,000 tons of RAILS with necessary ACCESSORIES —Angle Bars, Tie Plates, Frogs, Switches, Braces, Bolts, Nuts, Spikes, etc.,—materials for any type and extent of track development . . . inside trackage, sidings, extensions, main line, and for track repairs. Your order will be on its way in 1 to 24 hours after Foster receives it. Every shipment subject to your inspection and approval at destination. Every piece of Foster Rail Equipment absolutely guaranteed.
L.B. FOSTER COMPANY
PITTSBURGH ~ CHICAGO ~ NEW-YORK

Torpedo-Conveyor

Horizontal—*Simple, Efficient, Economical*

Since the first MIAG Torpedo Conveyor was placed in operation over 500 installations have been made in a variety of industries.

Engineers in Cement Plants, all over the world, know the efficiency of the Torpedo Conveyor in carrying coarse or fine, dry or wet material—cement clinker and crushed raw material.

Outlet Traps at Desired Points

For dividing and sending material into storage halls or into a series of bins, outlet traps are used. These single, double or triple flaps can be built into the trough at any point along the length of the conveyor. They permit discharging part of the material through one or more flaps, while the rest of the material is carried to other outlets. They can be opened or closed during operation without stopping the Torpedo.

MIAG machinery manufactures cement, lime, gypsum, etc., all over the world.

Ask for information regarding MIAG Titan Crushers, Compartment Mills, Roulette Mills, Rotary Kilns and Coolers with equipment for special low fuel consumption; Torpedo Shaking Conveyors, Dust Collectors, Gyratory Crushers, Roller Mills, etc.

Let MIAG Help Modernize Your Plant

AMERICAN MIAG CORPORATION

Marine Trust Building **Buffalo, N. Y.**

Classified Directory of Advertisers in this Issue of ROCK PRODUCTS

For alphabetical index, see page 144

Classified Directory of Advertisers in this Issue of ROCK PRODUCTS

For alphabetical index, see page 144

PERFORATED METAL SCREENS

A copy of our catalog will help you in selecting to best advantage. Send for it.

WITH a line of perforated metal screens that is complete, and with production facilities more than ample—we are prepared to take care of your every requirement with promptness and precision.

If you seek Perforated Metal Products from a source of known reliability—that assures you of highest quality, reasonable cost, and dependable service—then you can do no better than to come to Cross.

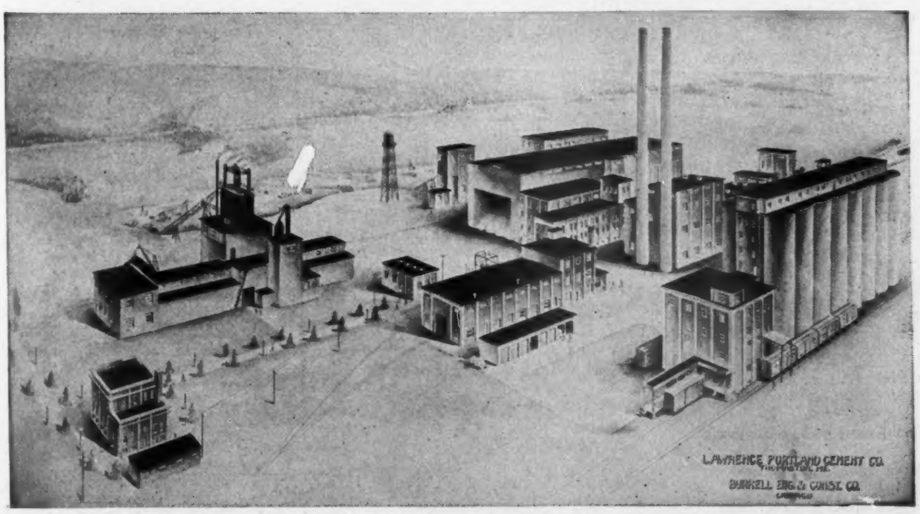
A large stock of material always on hand. Rush orders filled promptly.

CROSS ENGINEERING COMPANY

Office and Works—**Carbondale, Pa.**

BURRELL ENGINEERING and CONSTRUCTION COMPANY

513 JACKSON BLVD., CHICAGO



Designers and Builders of

Cement Plants,
Stone Crushing Plants,
Lime and Gypsum Plants, and
Associated Buildings

Our artist's conception of the plant under construction for Lawrence Portland Cement Company, Thomaston, Maine, noteworthy because plant is practically concrete throughout

A PARTIAL LIST OF OUR CLIENTS

Albert Mfg. Co.
Atlantic Gypsum Co.
Blue Mountain Stone Co.
Colorado Portland Cement Co.
Coplay Cement Mfg. Co.
Great Lakes Portland Cement Co.
Hoosac Valley Lime Co.
Huron Portland Cement Co.
Indiana Portland Cement Co.
International Cement Co.
Lawrence Portland Cement Co.
Lehigh Portland Cement Co.
Louisville Portland Cement Co.
Louisiana Portland Cement Co.
Michigan Alkali Co.
Nazareth Cement Co.
New York Trap Rock Co.
Newaygo Portland Cement Co.
Petoskey Portland Cement Co.
Sandusky Cement Co.
Southern Cement Co.
Tomkins Cove Stone Co.
United States Portland Cement Co.
United States Gypsum Co.
Utica Hydraulic Cement Co.
Volunteer Portland Cement Co.
Wellston Iron Furnace Co.

Classified Directory of Advertisers in this Issue of ROCK PRODUCTS

For alphabetical index, see page 144

Gear Reducers
Falk Corp.
Farrel-Birmingham Co., Inc.
Huron Industries, Inc.
D. O. James Mfg. Co.
W. A. Jones Fdy. & Machine Co
Waukesha Motor Co.

Generators (Acetylene)
Haynes Stellite Co.
Oxweld Acetylene Co.
Prest-O-Lite Co.

Generators (See Motors and Generators)

Goggles
Prest-O-Lite Co.

Grab Bucket Cranes (See Cranes)

Grab Bucket (Hoists & Monorail) (See Cranes)

Grab Buckets—(See Buckets, Grab, Clamshell, etc.)

Grating (Steel)
Kerlow Steel Flooring Co.

Grinding Balls
Coates Steel Products Co.
Electro Metallurgical Sales Corp.

Grizzlies
American Manganese Steel Co.
Austin Mfg. Co.
Eagle Iron Works
Galland-Henning Mfg. Co.
Good Roads Machy. Co., Inc.
Smith Engineering Works.
Stephens-Adamson Mfg. Co.
W. Toepfer & Sons Co.
Traylor Eng. & Mfg. Co.
Traylor Vibrator Co.

Grizzly Feeders
Traylor Vibrator Co.

Guard Rails
Koppel Industrial Car & Equipment Co.

Guns (Hydraulic)
Georgia Iron Works

Gypsum Plaster Plants
J. B. Ehrsam & Sons Mfg. Co.

Gyrating Screens (See Screens)

Hammer Drills
Chicago Pneumatic Tool Co.

Hammer Mills (See Crushers)

Hangers (Shaft)
T. B. Wood's Sons Co.

Hoists
Chicago Pneumatic Tool Co.
Dobbie Fdy. & Mach. Co.
S. Flory Mfg. Co.
Harnischfeger Corp. (Pawling & Harnischfeger)
Link-Belt Co.
Mead-Morrison Mfg. Co.
Mundy Sales Corp.
Northwest Engineering Co.
Sauerman Bros.
Smith Engineering Works
Street Bros. Mach. Works
Vulcan Iron Works.

Hose Couplings (See Couplings, Hose, Pipe)

Hose (Water, Steam, Pneumatic and Air Drill)
Chicago Pneumatic Tool Co.

Hose (Welding)
Prest-O-Lite Co.

Hydrators (Lime)
Arnold & Weigel.
Jackson & Church Co.
Kritzer Co.
McGann Mfg. Co., Inc.
H. Miscampbell

Hydraulic Guns (See Guns, Hydraulic)

Kilns and Coolers (Rotary)
Allis-Chalmers Mfg. Co.
American Miag Corp.
Bonnot Co.
Hardinge Co., Inc.
Manitowoc Eng. Works
McGann Mfg. Co., Inc.
Polysius Corp.
F. L. Smidth & Co.
Traylor Eng. & Mfg. Co.
Vulcan Iron Works.

Kilns (Shaft)
American Miag Corp.
Arnold & Weigel
Manitowoc Eng. Works
McGann Mfg. Co., Inc.
H. Miscampbell.
Vulcan Iron Works.

Kominuters (See Mills)

Laboratories (Magnetic)
Dings Magnetic Separator Co.

Lead Burning Apparatus
Prest-O-Lite Co.

Lime Handling Equipment
Arnold & Weigel.
Fuller Company
Kritzer Co.
Link-Belt Co.
H. Miscampbell.
Raymond Bros. Impact Pulv. Co.

Lime and Hydrating Plants
Arnold & Weigel
McGann Mfg. Co., Inc.
Vulcan Iron Works

Line Shaft Couplings
Falk Corp.
Huron Industries, Inc.
D. O. James Mfg. Co.
W. A. Jones Fdy. & Machine Co.

Linings (See Mill Liners & Linings)

Liquid Oxygen
Keith Dunham Co.

Loaders and Unloaders
Bucyrus-Erie Co.
Good Roads Machy. Co., Inc.
Harnischfeger Corp. (Pawling & Harnischfeger)
Link-Belt Co.
Marion Steam Shovel Co.
Northwest Engineering Co.

Locomotive Cranes (See Cranes)

Locomotives (Steam, Gas and Electric)
Fate-Root-Heath Co (Gas)
Lima Locomotive Works, Inc. (Steam)
Plymouth Locomotive Works (Gas).
Vulcan Iron Works
Geo. D. Whitcomb Co.

Locomotives (Storage Battery)
Geo. D. Whitcomb Co.

Machinery Guards
Harrington & King Perforating Co.

Magnetic Pulleys
Dings Magnetic Separator Co.

Magnetos
Eisemann Magneto Corp.

Magnets
Dings Magnetic Separator Co.

Manganese Steel
American Manganese Steel Co.
Electro Metallurgical Sales Corp.

Manganese Steel (Plate and Sheets)
Electro Metallurgical Sales Corp.

Manganese Steel Castings
Alloy Steel & Metals Co.
Electro Metallurgical Sales Corp.

Manifolds (Oxygen)
Prest-O-Lite Co.

Metals (Alloys, See Alloys, Babbitt Metal, Manganese Steel, Steel, etc.)

Mills, Grinding (Ball, Tube, etc.) (See also Crushers, Hammer)
Allis-Chalmers Mfg. Co.
American Miag Corp.
Bonnot Co.
Electro Metallurgical Sales Corp.
Hardinge Co., Inc.
Jackson & Church Co.
Raymond Bros. Impact Pulv. Co.
F. L. Smidth & Co.
Traylor Eng. & Mfg. Co.
Williams Patent Crusher & Pulverizer Co.

Mill Liners and Linings (Iron for Ball and Tube Mills)
F. L. Smidth & Co.

Mining Engineers (See Engineers)

Motors and Generators (Electric)
Allis-Chalmers Mfg. Co
Fairbanks, Morse & Co.

Motors (Gas and Gasoline)
Waukesha Motor Co.

Nuggets (Tubemill, Grinding)
Coates Steel Products Co.

Oil Burners
Chicago Pneumatic Tool Co.

Oil Burning Equipment
Electro Metallurgical Sales Corp.
Raymond Bros. Impact Pulv. Co

Oilers
Traylor Vibrator Co.

Ore Jigs
McLanahan-Stone Machine Co.

Oxy-Acetylene Apparatus
Haynes Stellite Co.
Prest-O-Lite Co.

Oxygen (Liquid) See Liquid Oxygen

Perforated Metal
Cross Engineering Co.
Harrington & King Perforating Co
Hendrick Mfg. Co.
Morrow Mfg. Co.
W. Toepfer & Sons Co.

Pile Drivers
Bucyrus-Erie Co.
Harnischfeger Corp. (Pawling & Harnischfeger)

Pipe
L. B. Foster Co.

Pipe Flanges
Georgia Iron Works

Pipe Line Filters
Staynew Filter Corp.

Plaster Board Dryers
Coe Mfg. Co.

Plug Valves (See Valves)

Pneumatic Drills (See Drills)

Poidometers
Schaffer Poidometer Co.

Portable Conveyors
Austin Mfg. Co.
Fuller Company
Link-Belt Co.
Stephens-Adamson Mfg. Co.

Portable Engines
Waukesha Motor Co.

Powder (Blasting)
Atlas Powder Co.
Hercules Powder Co.

Power Units
Fairbanks, Morse & Co.

Protectors (Crushers)
Dings Magnetic Separator Co.

Pulleys
Huron Industries, Inc.

Pulleys (Friction Clutch)
W. A. Jones Fdy. & Machine Co.
T. B. Wood's Sons Co.

Pulleys (Magnetic) (See Magnetic Pulleys)

Pulverizer Parts
American Manganese Steel Co.

Pulverizers (See also Crushers, Mills, etc.)
Allis-Chalmers Mfg. Co.
American Miag Corp.
Bonnot Co.
Hardinge Co., Inc.
Raymond Bros. Impact Pulv. Co
F. L. Smidth & Co.
Sturtevant Mill Co.
Williams Patent Crusher & Pulverizer Co.

Pumps (Air Lift)
Chicago Pneumatic Tool Co.
Fuller Co.
Pennsylvania Pump & Comp. Co.

Pumps (Cement Slurry)
Electro Metallurgical Sales Corp.
Fuller Co.
Polysius Corp.
F. L. Smidth & Co.
A. R. Wilfley & Sons.

Pumps (Centrifugal)
Allis-Chalmers Mfg. Co.
De Laval Steam Turbine Co.
Fairbanks, Morse & Co.
Pennsylvania Pump & Comp. Co.
A. R. Wilfley & Sons.

Pumps (Sand and Gravel)
Allis-Chalmers Mfg. Co.
American Manganese Steel Co.
Georgia Iron Works
Traylor Vibrator Co.
A. R. Wilfley & Sons.

Quarry Development
Electro Metallurgical Sales Corp.

Classified Directory of Advertisers in this Issue of ROCK PRODUCTS

For alphabetical index, see page 144

Rails
Easton Car & Construction Co.
L. B. Foster Co.
Koppel Industrial Car & Equipment Co.

Railway Equipment
Electro Metallurgical Sales Corp.

Regulators (Welding and Compressed Gas)
Prest-O-Lite Co.

Road Machinery
Austin Mfg. Co.
Bucyrus-Erie Co.
Chicago Pneumatic Tool Co.
Good Roads Machy. Co., Inc.
Harnischfeger Corp. (Pawling & Harnischfeger)
Marion Steam Shovel Co.
Northwest Engineering Co.
Orton Crane & Shovel Co.
Smith Engineering Works

Rock Drills (See Drills, Rock)

Rod Mills
Jackson & Church Co.
Traylor Eng. & Mfg. Co.

Roller Bearings
Timken Roller Bearing Co.

Roller Dryers
Coe Mfg. Co.

Roofing and Siding
New Jersey Zinc Co.

Rope (Wire) (See Wire Rope)

Sand Separators
Stephens-Adamson Mfg. Co.

Sand Settling Tanks
Link-Belt Co.
Smith Engineering Works
Stephens-Adamson Mfg. Co.

Scales (Automatic Proportioning)
Fairbanks, Morse & Co.

Scales (Cement)
Fairbanks, Morse & Co.

Scales (Truck and Railway Track)
Fairbanks, Morse & Co.

Scrapers (Power Drag)
Austin Mfg. Co.
R. H. Beaumont Co.
Link-Belt Co.
Northwest Engineering Co.
Sauerman Bros.
Street Bros. Mach. Works

Screens
Allis-Chalmers Mfg. Co.
American Manganese Steel Co.
Austin Mfg. Co.
Earle C. Bacon Co.
Cross Engineering Co.
Eagle Iron Works.
Galland-Henning Mfg. Co.
Good Roads Machy Co., Inc.
Hardinge Co., Inc.
Harrington & King Perforating Co.
Hendrick Mfg. Co.
Industrial Brownhoist Corp.
Link-Belt Co.
McLanahan-Stone Mach. Co.
Morrow Mfg. Co.
John A. Roebling's Sons Co.
Orville Simpson Co.
Smith Engineering Works.
Stephens-Adamson Mfg. Co.
Sturtevant Mill Co.
W. Toepfer & Sons Co.

Screens—Continued
Traylor Eng. & Mfg. Co.
Traylor Vibrator Co.
W. S. Tyler Co.
Universal Vibrating Screen Co.
Williams Patent Crusher & Pulverizer Co.

Seal Rings (Rotary Kiln)
Huron Industries, Inc.

Separators, Air (See Air Separators)

Separators (Magnetic)
Dings Magnetic Separator Co.

Separators (Slurry)
F. L. Smidth & Co.

Shafting
T. B. Wood's Sons Co.

Sharpening Machines, Drill (See Drill Sharpening Machines)

Sheaves
Dobbie Fdy. & Mach. Co.

Shovels (Revolving Caterpillar)
Marion Steam Shovel Co.

Shovels (Steam, Gas, Electric, Diesel, Oil)
Bucyrus-Erie Co.
Harnischfeger Corp (Pawling & Harnischfeger)
Industrial Brownhoist Corp.
Insley Mfg. Co.
Link-Belt Co.
Marion Steam Shovel Co.
Mongihan Mfg. Corp.
Northwest Engineering Co.
Orton Crane & Shovel Co.
Osgood Co.
Thew Shovel Co.

Signals (Mine and Quarry)
Traylor Vibrator Co.

Silos
Burrell Eng. & Const. Co.
F. L. Smidth & Co.

Skip Hoists and Skips
R. H. Beaumont Co.
Koppel Industrial Car & Equipment Co.
Link-Belt Co.
Stephens-Adamson Mfg. Co.
Street Bros. Mach. Works

Slings (Wire Rope)
A. Leschen & Sons Rope Co.
John A. Roebling's Sons Co.

Slugs (See Grinding Balls and Nuggets)

Speed Reducers
De Laval Steam Turbine Co.
Falk Corp.
Farrel-Birmingham Co., Inc.
Huron Industries, Inc.
D. O. James Mfg. Co.
W. A. Jones Fdy. & Machine Co.
Stephens-Adamson Mfg. Co.
Waukesha Mtoor Co.

Spouts, Chutes (See Chutes and Chute Liners)

Spouts (Magnetic)
Dings Magnetic Separator Co.

Sprockets and Chain
American Manganese Steel Co.
W. A. Jones Fdy. & Machine Co.

Steel Bars
Timken Roller Bearing Co.

Steel (Electric Furnace)
Timken Roller Bearing Co.

Steel Fabrication
H. K. Ferguson Co.

Steel (Open Hearth)
Timken Roller Bearing Co.

Steel Plate Construction
Hendrick Mfg. Co.

Steel (Special Alloy—See also Manganese Steel)
Alloy Steel & Metals Co.
Haynes Stellite Co.
Timken Roller Bearing Co.

Steel (Special Analysis)
Timken Roller Bearing Co.

Stellite
Haynes Stellite Co.

Steps (Safety)
Kerlow Steel Flooring Co.

Stokers
Raymond Bros. Impact Pulv. Co.

Stone Grapples—See Grapples (Stone)

Storage Equipment
R. H. Beaumont Co.
Sauerman Bros.

Tampers
Chicago Pneumatic Tool Co.

Tanks
Galland-Henning Mfg. Co.
Link-Belt Co.
Smith Engineering Works

Thickeners
Hardinge Co., Inc.
Traylor Vibrator Co.

Tools, Drill (See Drilling Accessories)

Tool Steel
Electro Metallurgical Sales Corp.
Haynes Stellite Co.

Torches
Haynes Stellite Co.
Prest-O-Lite Co.

Track Equipment
Easton Car & Construction Co.
L. B. Foster Co.
Koppel Industrial Car & Equipment Co.

Track Shifters
Nordberg Mfg. Co.

Tractor Engines
Waukesha Motor Co.

Trailer Cranes (See Cranes)

Transmission Machinery
Allis-Chalmers Mfg. Co.
Farrel-Birmingham Co., Inc.
Huron Industries, Inc.
D. O. James Mfg. Co.
W. A. Jones Fdy. & Machine Co.
Kritzer Co.
Stephens-Adamson Mfg. Co.
Timken Roller Bearing Co.
T. B. Wood's Sons Co.

Trenchers (Wheel and Ladder Type)
Harnischfeger Corp. (Pawling & Harnischfeger)

Troughs
Cross Engineering Co.

Truck Cranes (See Cranes)

Tube Mills (See Mills, Ball, Tube, etc.)

Tube Mill Liners (See Mill Liners)

Tubing (Seamless Steel)
Timken Roller Bearing Co.

Tunnelling Machines
Bucyrus-Erie Co.

Turbines
De Laval Steam Turbine Co.

Turbo Generators
De Laval Steam Turbine Co.

Turntables
Easton Car & Const. Co.
Koppel Industrial Car & Equipment Co.

Underground Loaders
Bucyrus-Erie Co.
Thew Shovel Co.

Valves
Haynes Stellite Co.
Prest-O-Lite Co.

Vibrating Screens (See Screens)

Wall Board Dryers
Coe Mfg. Co.

Washers (Sand, Gravel and Stone)
Allis-Chalmers Mfg. Co.
Eagle Iron Works
Galland-Henning Mfg. Co.
Link-Belt Co.
McLanahan-Stone Mach. Co.
F. L. Smidth & Co.
Smith Engineering Works.
Stephens-Adamson Mfg. Co.
W. Toepfer & Sons Co.
Traylor Eng. & Mfg. Co.

Weighing Equipment
Fairbanks, Morse & Co.
Merrick Scale Mfg. Co. (Automatic Proportioning).
Schaffer Poidometer Co.

Welding and Cutting Apparatus
Haynes Stellite Co.
Prest-O-Lite Co.

Welding Wire
John A. Roebling's Sons Co.

Well Drills (See Drills, Well)

Wheels (Car)
American Manganese Steel Co.
Eagle Iron Works
Easton Car & Construction Co
Electro Metallurgical Sales Corp.
Koppel Industrial Car & Equipment Co.
Vulcan Iron Works.

Winches and Capstans
Dobbie Fdy. & Mach. Co.
Mead-Morrison Mfg. Co.
Mundy Sales Corp.

Wire Cloth
John A. Roebling's Sons Co.
W. S. Tyler Co.

Wire Rope
A. Leschen & Sons Rope Co
John A. Roebling's Sons Co.
Williamsport Wire Rope Co.

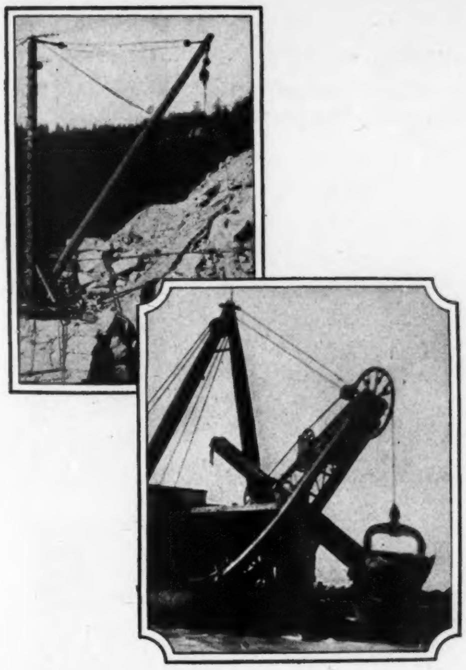
Wire Rope Fittings
A. Leschen & Sons Rope Co
John A. Roebling's Sons Co.

Wire (Welding)
Haynes Stellite Co.

Worm Gears (See Gears)

Zinc
New Jersey Zinc Co.

ROEBLING WIRE ROPE



In excavating work exceptional conditions exist which must be met by the use of wire rope possessing exceptional qualities. Our

"BLUE CENTER" STEEL WIRE ROPE

possesses these qualities and is the ultimate choice of discriminating engineers for every purpose for which wire rope is used.

Catalog A-545

John A. Roebling's Sons Company Trenton, N. J.

Announcement

We have designed a new complete series of speed reducers combining FARREL-SYKES gears, TIMKEN roller bearings and new features of design.

A series of reducers which are not merely new, but which are far ahead of any hitherto constructed; they are more compact, more efficient and more durable.

And, further, due to new high speed SYKES Gear Generators and increased production facilities, we are able to offer them at prices slightly in excess of a common spur reducer.

Fill in request form for details

FARREL-BIRMINGHAM CO., INC.

SUCCESSORS TO
FARREL FOUNDRY & MACHINE CO, ANSONIA, CONN. AND
BUFFALO, N.Y. AND BIRMINGHAM IRON FOUNDRY OF DERBY, CONN.
ADDRESS REPLIES TO THIS ADVERTISEMENT TO BUFFALO PLANT
344 VULCAN ST., BUFFALO, N. Y.

Farrel-Birmingham Co., Inc.
344 Vulcan Street
Buffalo, New York

Send details of new speed reducers.

Name..............................

Address..............................

NORBLO

Dust Collecting Equipment—

NORBLO Dust-Collectors and Incoming Pipe Lines; in the Valley Forge Portland Cement Company

CEMENT, Lime, Gypsum or Stone Plants—in fact any plant where there is a dust problem to contend with—may have COMPLETE DUSTLESSNESS by the installation of NORBLO.

And in the modern plant, efficient equipment for dust control and recovery is considered essential. Almost as essential in fact as the producing equipment itself—for upon the effectiveness with which the plant is kept free from dust depends to a great degree the length of life and operating economy of the machinery and equipment actually responsible for plant output.

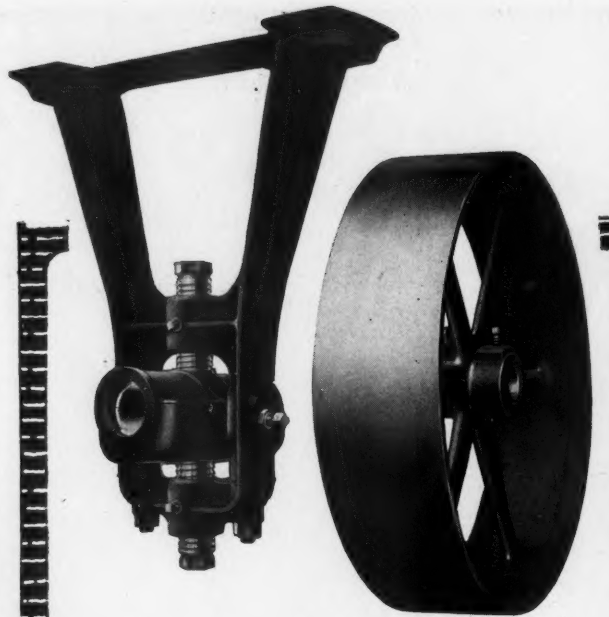
The presence of NORBLO Dust-Collecting Equipment in your plant will have several effects. One of the most important will be the prevention of the devastating effects of free dust on plant equipment. With NORBLO equipment you SAVE MACHINERY and incidentally—SAVE THE DUST.

The Norblo Guarantee—

We will give you complete satisfaction, and we positively guarantee NORBLO Equipment to conform to the requirements of your State Sanitary Laws and to be unsurpassed in construction and operation for the class of work for which it is intended.

NORTHERN BLOWER CO.

West 65th St. and Denison, Cleveland



The T. B. WOOD SONS CO. Line

of POWER TRANSMISSION MACHINERY is complete and efficient because it includes not only every article pertaining to the line, but also many different types of each article.

For example, we manufacture eighteen different types of Shaft Couplings, five types of Hangers, sixteen types of Pillow Blocks and so on throughout the whole line.

Only by making such a great variety of different types of appliances can complete equipments be furnished that are balanced throughout, and where each unit is properly designed to perform its particular duty.

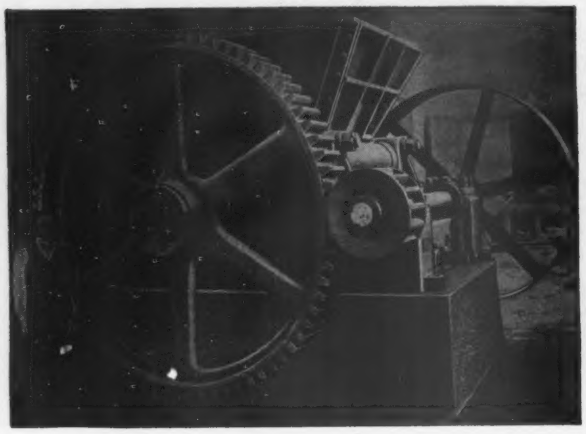
DRIVE RIGHT

POWER TRANSMISSION ASSOCIATION

T. B. Wood's Sons Co.

Chambersburg, Pa.

POWER-TRANSMISSION MACHINERY AND SPECIAL-MACHINERY



IF you had seen the McLanahan Single Roll Crusher before ordering your first Gyratory or Jaw Crusher you would now be running only the McLanahan Crushers.

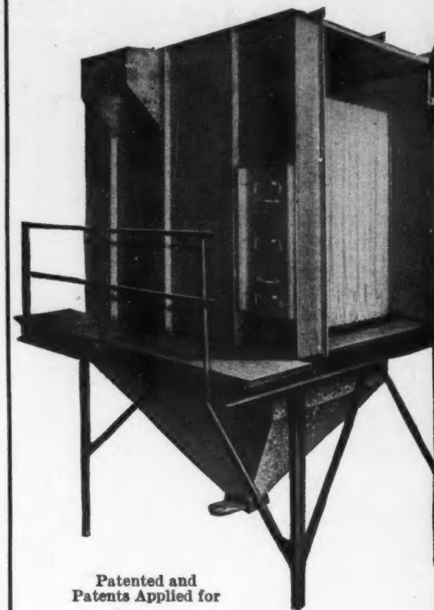
After many years' practical experience building and operating other crushers, we brought out the first Single Roll Crusher, proved it best, simplest and most economical—making least fines—requires but little head room—no apron or hand feeding—takes wet or slimy material.

Capacity, 5 to 500 Tons Per Hour

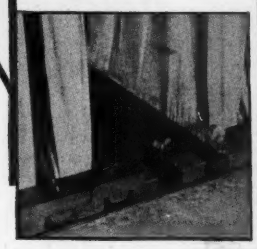
McLanahan-Stone Machine Co.
Hollidaysburg, Pa.

Screens, Elevators, Conveyors, Rock Washers, Etc.

New Type Dust Arrestor



Each bag has individual spring suspension. Shaking is done horizontally, like snapping a rug, flexing material and getting all dust out of cloth.
In ten minutes a bag can be replaced and operation resumed.

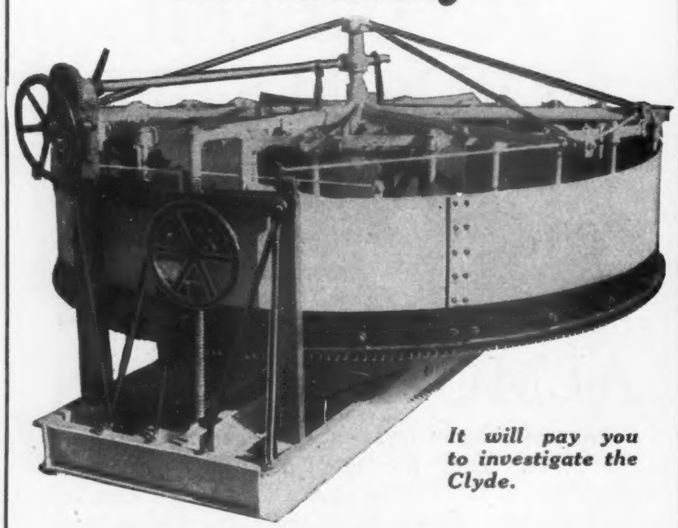


Patented and Patents Applied for

"Quality Equipment Pays in the End"

THE NEW HAVEN SAND BLAST CO.
New Haven, Conn. Cleveland, Ohio

Invariably—



It will pay you to investigate the Clyde.

The experience of users has borne out our contention that the "Clyde" Hydrator represents the utmost in value and dependability. For many years it has been used by the majority of hydrate producers—who have learned from intimate experience that it is a machine worthy of every confidence. Specify the "Clyde"; it will serve you well.

We also manufacture Vertical Shaft and Rotary Lime Kilns, Dust Collectors for Lime and Cement Plants

H. MISCAMPBELL
Patentee and Sole Manufacturer

DULUTH Patented Aug. 14, 1923......Serial No. 1464722 **MINNESOTA**

OHIO LOCOMOTIVE CRANE

Steam—Gas—Electric

Hook, Clamshell, Dragline Magnet or Pile Driver Service

10 to 50 Ton Capacities

The Crane with the 10 Year Guarantee
Catalog on Request

THE OHIO LOCOMOTIVE CRANE CO.
High Street, Bucyrus, Ohio

CLASSIFIED ADVERTISEMENTS

POSITIONS WANTED—POSITIONS VACANT
Two cents a word. Set in six-point type. Minimum $1.00 each insertion, payable in advance.

INFORMATION
Box numbers in care of our office. An advertising inch is measured vertically in one column. Three columns, thirty inches to the page.

CLASSIFIED—Displayed or undisplayed. Rate per column inch, $4.00. Unless on contract basis, advertisements must be paid for in advance of insertion.

USED EQUIPMENT

MACHINERY FOR SALE

JAW CRUSHERS—2½x4; 4x12; 8x10; 9x15; 10x20; 12x24; 13x30; 24x36; 30x42; 60x84.

GYRATORY CRUSHERS—All sizes, various makes.

CRUSHING ROLLS—8x5; 20x14; 21x11; 24x10; 24x14; 30x16; 36x16; 42x16.

DRYERS AND KILNS—Single shell—3½x16; 4x20; 4x30; 4'9"x36; 5x25; 5x50; 5½x40; 6x40; 7x70; 7x100; 8x80; 9x124; Double shell—3x16; 4x20; 5x30; 6x40; 8x85.

TUBE MILLS—3'x12", 4x16; 5x20; 5x22; 5'6"x16; 5'6"x20.

HARDINGE MILLS—3'x8"; 4½x16; 5x22; 6x22; 8x30; 8x36; 8x48.

PULVERIZERS—2-, 3-, 4-, 5-roll, high and low side Raymond Mills, also Beater types; 33" to 42" Fuller Lehigh Mills, Griffin Mills.

SWING HAMMER MILLS—All sizes—Williams, Jeffrey, Gruendler, Pennsylvania.

Send us your inquiries
Send us a list of your surplus equipment

Consolidated Products Company, Inc.
15-16-17 Park Row N. Y. C. Barclay 0603
Shops and Yards at Newark, N. J., cover 5 acres

FOR SALE

Rotary Kilns

2—8'x125'.
1—9'x100'.
1—7'x120'.
2—7'x100'.
1—7½'x80'.

Dryers (Rotary)

1—5'6"x50' American Process Direct.
1—5'6"x40'.

Crushers (Gyratory)

1—No. 6 McCully.
1—No. 7½ Kennedy.
1—No. 9-K Allis-Chalmers.

Equipment Sales Co.
R. W. STORRS, Jr., Manager
Richmond, Virginia

DRAGLINES

Class 24 Electric, 4 yd. capacity.
Class 14 Steam, 2 yd. capacity.

DUMP CARS

4—Western, 6 yd., standard gauge.
8—Western, 4 yd., 36 in. gauge.
12—Lakewood, 1½ yd., 24 in. gauge.

GASOLINE LOCOMOTIVES

1—Plymouth, 4 ton, 24 in. gauge.
1—Midwest, 4 ton, 24 in. gauge.

STONE SCREEN

1—Heavy Duty, 3 ft. by 12 ft. long, with A. C. motor.

CENTRIFUGAL PUMPS

8—Allis-Chalmers, 12 in., 3400 gal. per minute at 180 ft. head, direct connected to 200 h.p., 3 ph., 60 cy., 2200 v. motor.

THE U. G. I. CONTRACTING CO.
Attention: R. C. Stanhope, Jr., Supervisor of Equipment
U. G. I. Building Philadelphia, Pa.

CLASSIFIED ADVERTISEMENTS

USED EQUIPMENT

MACHINERY FOR SALE

SPECIAL

One No. 6 Williams Universal Pulverizer.
One new 8'x125' Kiln.

ROTARY CRUSHERS

Three No. 00, Three No. 1, One No. 1½, One No. 2 Sturtevant Rotary Fine Crushers, One No. 0, One No. 1 Sturtevant Ring Roll Mills.

GYRATORY CRUSHERS

All sizes from No. 2 Reduction up to 12K.

JAW CRUSHERS

One 4"x8", Two 7"x10", Two 9"x15", One 6"x20", One 10"x15", One 10"x20", Two 12"x24", One 13"x30", One 15"x36", One 18"x36", One 24"x36", One 22"x50", One 36"x48", One 40"x42", One 60"x84".

CRUSHING ROLLS

One 8"x6", Two 14"x20", Two 16"x10", One 24"x12", Three 30"x10", Two 36"x16", Two 42"x16, and One 54"x24" Crushing Rolls.

DRYERS

One 3'x20', Three 4'x30', One 5'x40', Two 5½'x 40', One 6'x60', One 7'x60', and Two 8'x80' Direct Heat Rotary Dryers, One 5'x25', One 6'x30' Ruggles Coles type "A" and One 4'x 20' Ruggles Coles type "B" Double Shell Rotary Dryers, Three 6'x25' Louisville Dryers.

KILNS

One 4'x40', Two 6'x60', Two 6'x90', One 6'x 100', One 6'x120', One 7½'x80', Three 8'x 125'.

HARDINGE MILLS

One 4½', Two 6' and Two 8' Hardinge Mills.

SWING HAMMER AND TUBE MILLS

Fuller, Griffin and Raymond Mills, Screens, Air Separators, etc.

THE HEINEKEN ENGINEERING CORP.
117 Liberty St. New York City
Telephone Cortlandt 5130

ZELNICKER'S BULLETIN

Lists unusual bargains in Rails, Equipment, Oil Engines, Tanks, Pipe.

Get your copy now

ZELNICKER IN ST. LOUIS

New—Standard Make

1½ cu. yd. Steam and Electric

SHOVELS

At Greatly Reduced Prices

A two motor electric shovel equipped with 50 hp. hoist and swing motor, and 20 hp. crowd motor. High lift—heavy duty—factory guaranteed.

Also a new heavy duty, high lift steam shovel. Can be equipped with boom up to 32 feet in length.

Either machine recommended for severe operation requiring large output.

Terms to Meet Your Convenience

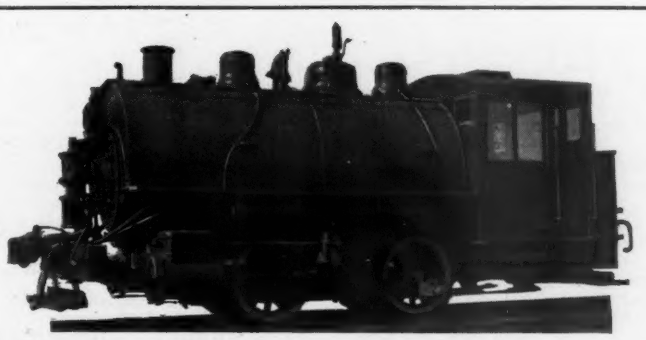
CHAS. F. COHEN
132-5 Cornell Ave. Elyria, Ohio

FOR SALE

1—75 H.P. Electric Stripping Outfit.
1—Gas Portable Core Drill.
1—No. 3 Gates Gyratory Crusher with Screens.
1—No. 9-K Gates Gyratory Crusher.
2—No. 8-D Gates Gyratory Crushers.
1—No. 5 Telsmith Gyratory Crusher.
1—No. 7 Williams Fine Grinder.
1—No. 7½-D Gates Gyratory Crusher.
1—18"x36" Farrell Jaw Crusher.
1—36"x48" Traylor Bull Dog Crusher.
1—No. 6 Austin Gyratory Crusher.
2—No. 5-K Gates Crushers.
1—Complete 400 Yard Gravel Plant.
1—Complete Small Stucco Plant.
1—6'x22" Hardinge Conical Ball Mill.
1—41-ton Baldwin Standard Gauge Locomotive.
2—Complete ¾-yd. Gas Cableway Outfits; 1 steam.
1—Sauerman 1-yd. Outfit, without power.
1—Sauerman 2-yd. Electric Outfit, complete.
1—New 200 H.P. G. E. Motor.
1—65' Center Bucket Elevator.
50—Steam and Electric Channelers.
1—33" Fuller Mill.
1—3'x30' Indirect Fired Dryer.
1—42" Gas Whitcomb Locomotive.
1—150' Matthew Gravity Conveyor.

Send us your inquiries and we will send you our offerings from our $15,000,000 Listing.

National Equipment Company
Bloomington, Indiana



32 ton, American, 32-in. wheel centers, 175 lbs. pressure, air and steam brakes; completely overhauled.

75 ton, 21x26-in., 6-wheel switcher, piston valve, Walschaert valve gear, superheated; built Dec., 1922.
50 ton, saddle tank, new boiler, new cylinders, new tank, new tires.
17—16-yd. Western dump cars, rebuilt; new bodies, steel lined floors.
10—20-yd. Western dump cars, all steel, vertical air cylinders.

HAVE FORTY LOCOMOTIVES, OVERHAULED AND READY, 5 TO 100 TONS, CARS, SHOVELS, CRANES, RAIL, ETC.

ALSO
LOCOMOTIVE SPRINGS, MANUFACTURED AT OUR WORKS HERE

SOUTHERN IRON & EQUIPMENT COMPANY
(Est. 1889)
ATLANTA - - - - - GEORGIA

Complete Electric Quarry Equipment

We offer for sale at about one-half cost, our entire equipment, consisting of Electric Power Plant, Drums and between 800 and 900 ft. of 2-in. cable, several heavy skips to raise stone from a 75 ft. deep quarry. Works abandoned. No further use for the same.

WM. T. B. ROBERTS & SON
Glenside, Montgomery Co., Pa.

FOR SALE

1—18-B Bucyrus Shovel, caterpillar tread, steam equipped with special boom for loading into railroad equipment. Recently overhauled and in good mechanical condition.
1—38-ton standard saddle tank locomotive.
1—carload of 80 lb. rails.
1—double drum contractor's steam hoist and miscellaneous dragline equipment, consisting of ropes, buckets, carriers, rope blocks and other equipment.

Any reasonable offer accepted for any of the above equipment. Material located within 30 miles of Des Moines, Iowa.

KANSAS AND IOWA COAL COMPANY
1219 Southern Surety Building
Des Moines, Iowa

CLASSIFIED ADVERTISEMENTS

POSITIONS WANTED—POSITIONS VACANT
Two cents a word. Set in six-point type. Minimum $1.00 each insertion, payable in advance.

INFORMATION
Box numbers in care of our office. An advertising inch is measured vertically in one column. Three columns, thirty inches to the page.

CLASSIFIED—Displayed or undisplayed. Rate per column inch, $4.00. Unless on contract basis, advertisements must be paid for in advance of insertion.

USED EQUIPMENT

Crushers No. 12, 10, 9, 8, 7, 6, 5, 4
Roll Crushers
84x72, 36x60, 72x30, 18x30
60x84—Jaw Crushers—16x60
36x48—40x42—26x50—24x36—20x34—60x84
12x37—18x36—13x30—7x24—7x16—10x22
2—30 and 37 Kennedy Gearless Crushers.
DISC CRUSHERS, 48", 36", 24", 18"
3 Oil Engines 200 H. P., New
¾—1 AND 1½—2½-YD. CAT SHOVELS
5 Ton Crane 70' Span A C Motors
AIR COMP.—HOISTS—KILNS
DRAG LINES—LOCO. CRANES—MOTORS
Other BARGAINS—(Send us your inquiries)
Ross Power Equipment Co.
13 South Meridian St. Indianapolis, Ind.

CRUSHER BARGAINS

Kennedy No. 30 Gearless breaker 30"x 115". Capacity 400 to 800 tons per hour.
Kennedy No. 37 Gearless Reduction Crusher. Capacity 25 to 100 tons.
Gates 7½-K. Fine condition.
2—Hardinge 36" Mills with Feeding Device. Bronze worm gear & Receiving Hopper for finished product.
Allis-Chalmers Fairmount type 36"x60" Roll Jaw Crusher.
Marion 37 Steam Shovel, Caterpillar, 1¾-yd.; like new.
Byers Bearcat Crane 28' Boom, ½ yd.
Other Crushers, All Types and Sizes on Hand
F. MAYER, Monadnock Bldg., Chicago, Ill.

FOR SALE

4½x12' Allis-Chalmers Tube Mill with new manganese lining.
3-, 4- and 5-roll Raymond Mills.
No. 1, No. 00 and No. 0000 Raymond Mills.
Infant, No. 2 and No. 6 Williams Mills.
42" Fuller-Lehigh Mills.
80"x45' and 8'8"x85' Ruggles-Coles Dryers.
4½x52½' Rotary Dryer or Calciner.
8'x80' Rotary Dryer, single shell.
42"x40' Rotary Kiln, cement lined.
Style A-2 and B-1 Broughton Mixers.
ROBERT P. KEHOE MACHINERY CO.
7 East 42nd St. New York, N. Y.

FOR SALE

New and used Rotary Dryers. Write us your requirements.

McDERMOTT BROS. CO.
Allentown, Penna.

In stock 250—24" gauge 2-way Western and Austin dump cars, one and one and one-half yard capacity, in good serviceable second-hand condition. Also a number of new "V" shaped dump cars, 24" gauge: rails, new and relaying and all sorts of tracks supplies of all sections.

Park Row Bldg. New York City **M. K. FRANK** Union Trust Bldg. Pittsburgh, Pa.

LOCATED AT BENSON MINES, ST. LAWRENCE COUNTY, N. Y.

Below is a brief inventory of the plant. If you do not see what you want, full inventory will be mailed you.

A Lot of MOTORS Varying in Size from 25 h.p. to 200 h.p., 3 phase, 60 cycle, 440 volts.
3—300 KVA TRANSFORMERS.
1—100 KW GENERAL ELECTRIC STEAM TURBO GENERATOR SET.
1—Single Drum STEAM HOIST, Cylinder 8x12-inch. Drum 12x18-inch.
1—VULCAN, Single Drum, double cylinder STEAM HOIST, Cylinders 4x8-inch. Drum 6x15-inch.

Steel Buildings

1—45 ft. wide, 136 ft. long by 75 ft. high (4 floors).
1—76 ft. wide, 143 ft. long, 36 ft. high.
1—34½ ft. wide, 47 ft. long, 75 ft. high.
1—40 ft. wide, 126 ft. long, 30 ft. high,
1—40 ft. wide, 40 ft. long, 50 ft. high.
1—"U" Shape ALL STEEL STORAGE BIN, Capacity about 200 tons of coal.

2—No. 70 BUCYRUS STEAM SHOVELS.
2—36x36-inch GIANT CRUSHING ROLLS.
1—18x30-inch GIANT SMOOTH ROLLS.
1—18x24-inch SPIKE CRUSHING ROLLS.
2—8x6-ft. KENNEDY BALL MILLS.
2—33-Ton Standard Gauge SADDLE TANK LOCOMOTIVES.
2—304-H.P. B. & W. RUST BOILERS.
2—10-ft. MORGAN Mechanical GAS PRODUCERS.
4—DEWATERING MACHINES.
2—NEWAYGO SCREENS, Class E, No. 3.
1—CARWELL 36-inch Track Gauge BELT CONVEYOR TRIPPER.
1—ELEVATOR, 75-ft. centers. Elevator complete with tail pulley and take-up bearings with 150 "V" shape 9x12x16 steel buckets with reinforced edges, with 17-inch stitched canvas 6-ply belt.
2—ELEVATORS, 26-inch width, 60-ft. centers, 6-ply rubber belt, with 160 6x7x12-inch malleable buckets.
1—ELEVATOR, 25-ft. centers, 22-inch, 6-ply rubber belt, with 55 10x12x21-inch reinforced edge steel buckets.
325—9x12x12-inch "V" shape ELEVATOR BUCKETS.
7—42x48-inch TRUMMER SCREENS.
A LOT OF NEW SPUR GEARS AND SPROCKETS.
1—DAVIS STEAM POWER 3½-inch CORE DRILL.
1—⅝-yard ORANGE PEEL BUCKET.
1—⅞-yard ORANGE PEEL BUCKET.
7000—2½x4½x9-inch FIRE BRICK. New.
2000—KILN LINING BRICKS, 3¼x6x9-in. New.
200—Tons 60-lb. RE-LAYER RAILS with 10 sets Frogs and Switches.
4—4-yard WESTERN WHEELED DUMP CARS.
1—No. 80 STURTEVANT EXHAUST FAN.
1—No. 55 STURTEVANT EXHAUST FAN.
1—No. 36 STURTEVANT EXHAUST FAN.
1—PIPE THREADING MACHINE, 2-in. to 6-in.
1—BLACKSMITH FURNACE AND BLOWER.
1—FRANKLIN PORTABLE CRANE HOIST.
1—No. 13 NIAGARA SHEAR. Will cut iron up to ⅜ inch.

THE EQUIPMENT SALES COMPANY

Richmond, Va.

R. W. Storrs, Jr., Manager **Address reply to Benson Mines, N. Y.**

REBUILT LOCOMOTIVES

72-ton American 6-wheel switcher, separate tender, 180 lb. steam. Eight duplicates.
54-ton Baldwin 6-wheel switcher, separate tender, 200 lb. steam; built 1913.
50-ton Baldwin 6-wheel switcher, separate tender; built 1907.
43-ton Baldwin 6-wheel switcher, separate tender, 180 lb. steam; built 1917.
35-ton Baldwin 4-wheel switcher, separate tender, 180 lb. steam; built 1921.
42-ton American 4-wheel saddle tank, 180 lb. steam; built 1910; Ohio boiler.
31-ton Baldwin 4-wheel saddle tank, 160 lb. steam; built 1914.
21-ton Porter 4-wheel saddle tank; built 1912. 36" gauge.
18-ton Porter 4-wheel saddle tank, built 1910-11, 36" gauge. 3 duplicates.

REBUILT DUMP CARS

20-yard all steel Western air dump, vertical cylinders. Ten of these.
12-yard steel underframe hand dumps. Seven of these.
6-yard steel underframe hand dumps. Eight of these.

REBUILT LOCOMOTIVE CRANES

20-ton Link-Belt 8-wheel, 2-line; built 1916.
15-ton Ohio 8-wheel, 2-line; built 1919.

BIRMINGHAM RAIL & LOCOMOTIVE COMPANY
Birmingham Alabama

GASOLINE SHOVELS

1—KOEHRING, Caterpillar, new 1926, 1-yd., HIGH LIFT, overhauled, like new.
1—OSGOOD HEAVY DUTY (1-yd.) Caterpillar, new 1927, 1-yd. dipper; HIGH LIFT; also 40 ft. crane boom if desired, like new.

STEAM SHOVELS

1—ERIE B-2 DREADNAUGHT, Caterpillar, new 1927, 1-yd., HIGH LIFT, perfect condition.
1—30-B BUCYRUS, Caterpillar, new 1926, 1⅛-yd. dipper; boom 22 ft., dipper handle 16 ft.; first class condition.

GREY STEEL PRODUCTS COMPANY
111 Broadway New York, N. Y.

CLASSIFIED ADVERTISEMENTS

POSITIONS WANTED—POSITIONS VACANT Two cents a word. Set in six-point type. Minimum $1.00 each insertion, payable in advance.

INFORMATION Box numbers in care of our office. An advertising inch is measured vertically in one column. Three columns, thirty inches to the page.

CLASSIFIED—Displayed or undisplayed. Rate per column inch, $4.00. Unless on contract basis, advertisements must be paid for in advance of insertion.

USED EQUIPMENT

RAILS New and Relay
ALL WEIGHTS AND SECTIONS
FROGS—SWITCHES—TIE PLATES
S. W. LINDHEIMER
38 S. Dearborn St. Chicago, Ill.

UNIVERSAL CRUSHER COMPANY
Eastern Agents
All Steel Jaw Crushers. Also used equipment in crushing and power lines.
HOOPER-MOMBERGER CO.
90 West St., New York City Phone Rector 2919

FOR SALE

¾ cu. yd. American Steam Shovel. Full revolving on wheels. Ready to operate. Only $2500. Part time payments.

BROWNLEE PARK GRAVEL CO.
R. F. D. No. 1 Battle Creek, Mich.

FOR SALE

1—Jeffrey type D, ball-bearing Pulverizer (Hammer-Mill) with extra parts. $750.00 f.o.b. East Liberty, Ohio. We guarantee this machine to be in good working condition.

1—No. 3 Austin gyratory crusher in good condition, $750.00.

EAST LIBERTY STONE COMPANY
1019 Lima Trust Bldg. Lima, Ohio

FOR SALE

1—48 in. by 16 ft. Revolving Screen with 20 H.P., 440 volt motor back geared to same.

1—20-ton, 11x16 in. American Saddle Tank Locomotive No. 42405.

E. T. WALKER Centerville, Ohio

USED EQUIPMENT WANTED

WANTED

Used ¾ cu. yd. Sauerman Crescent Drag Scraper. Used Parts for 200 ft. 18" Belt Conveyor.

THE SEYMOUR SAND & STONE CO.
Seymour, Conn.

WANTED

3 foot diameter, 5 foot long, or equal, ball or tube mill, second hand. Submit complete details, including price and location.

Address Box 150, care of Rock Products 542 South Dearborn Street, Chicago, Ill.

Used Equipment Wanted
If in need of good used equipment make your wants known here and see how quickly you can fill them at reasonable cost.

BUSINESS OPPORTUNITIES

For Sale
COMPLETE COMMERCIAL DUNTILE PLANT

In first class condition. Located New York. Ready to operate. Must be sold immediately at a real bargain. Don't answer unless you mean business.

Oolitic Stone Art Works
Bloomington, Indiana

GYPSUM
Mining, Quarrying, Processing, Construction, and Research

The undersigned is available for consultation and service to the Gypsum Products Industry in connection with all problems relating to the production and use of gypsum plaster, stucco, wallboard, tile, etc. I have facilities for testing and research work, and a background of successful experience as a chemist and superintendent of gypsum plants.

Walter B. Lenhart
265 Quincy Ave., Long Beach, Cal.

FOR QUICK SALE AT SACRIFICE

A 300-ton stone crushing plant complete in every detail; running now, with contracts for this season. Location Eastern Indiana.

Address inquiries to
THE WABASH STONE COMPANY
Geneva, Indiana

FOR SALE

Two deposits of limestone in northwest Florida—both large tonnage and high grade. Railroad runs through one and no great distance from other. Should interest cement manufacturers. Address

S. D. CRENSHAW
P. O. Box 667 Richmond, Va.

POSITIONS WANTED

GRADUATE MINING ENGINEER—NINE years nonmetallic mining experience, engineer to superintendent. Thoroughly familiar with the gypsum industry. Desire connection with company that will recognize executive and managerial abilities and one that offers a bright future. Very adept at handling men. Energetic hustler that can get results and assure lower costs. Address Box 136, care of Rock Products, 542 South Dearborn Street, Chicago, Illinois.

ENGINEER, EXPERIENCED IN DESIGN, construction and operation; cement, lime, crushing, pulverizing, conveying, ore handling and treating plants. Considerable experience in other industrial manufacturing lines. Address Box 2253, care of Rock Products, 542 South Dearborn St., Chicago, Ill.

POSITIONS WANTED

SUPERINTENDENT, WITH LONG EXPERIENCE in the crushed stone and gravel industry, desires change. Familiar with heavy and efficient operation steam or electric, drilling, blasting, milling. Location anywhere. Excellent references. Address Box 152, care of Rock Products, 542 South Dearborn Street, Chicago, Ill.

QUARRY SUPERINTENDENT—CAPABLE of handling all machinery or build plants. Am also millwright and have had twenty years experience in cement business and four years in the mining of rock under state inspection. Address Box 151, care of Rock Products, 542 South Dearborn Street, Chicago, Ill.

SUPERINTENDENT—15 YEARS EXPERIENCE in charge of limestone mines, quarries and lime burning plants. Executive ability and experienced in plant design and construction, mine and quarry development. Address Box 112, care of Rock Products, 542 So. Dearborn St., Chicago, Ill.

CEMENT CHEMIST—OVER 12 YEARS broad experience as chief chemist. Successful record; good references. Available now. Address Box 147, care of Rock Products, 542 So. Dearborn St., Chicago, Ill.

POSITIONS VACANT

OPERATOR—EXPERIENCED ON MARION Electric, with Ward-Leonard control. Apply Foley Brothers, Inc., 117 Liberty Street, New York City.

WANTED—MAN TO OPERATE CABLEWAY hoist in sand pit. Give experience, age, wages. H. W. Lackey, Dunes Sand Co., Griffith, Ind.

THESE columns offer you the best medium in the rock products industry for the sale, exchange and purchase of used equipment, rock, quarry and gravel-pit property; the circulation and buying influence of Rock Products extends beyond those now actually engaged in operating plants; it includes mining engineers and capitalists who may be reached through no other medium, because of Rock Products' world-wide reputation as the *business journal* of the rock products industry.

INDEX TO ADVERTISEMENTS